Journal

OF THE NATIONAL ASSOCIATION OF CHIROPODISTS

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VOL. 46, NO. 2 FEBRUARY, 1956

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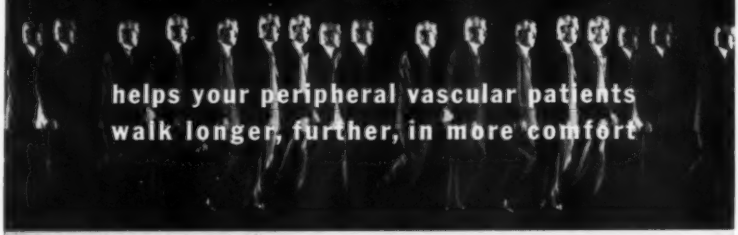

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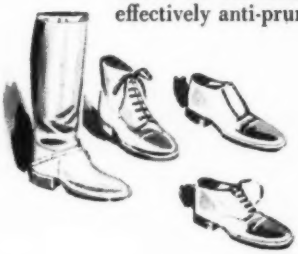

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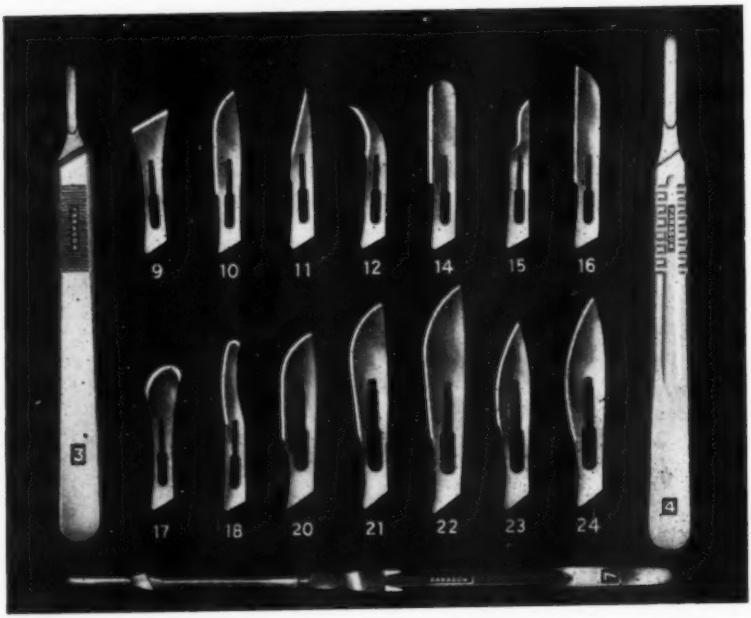

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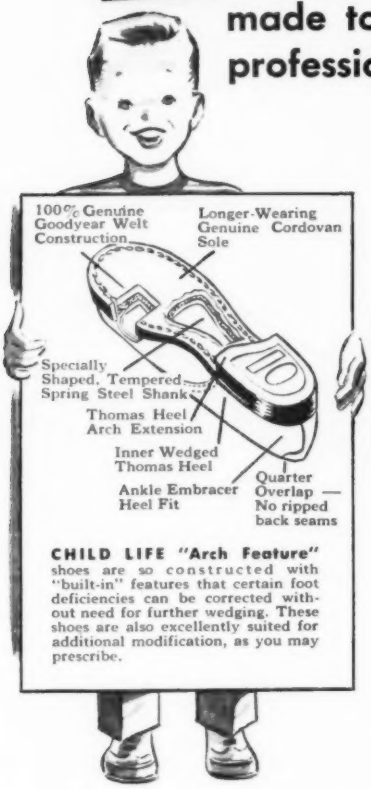
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The full roster of lecturers is not complete at this printing. Watch for the March issue of this JOURNAL in which will appear the complete details of the entire scientific program.

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Saturday, March 17th

9:00-10:30	Dr. H. W. Leibold	"Orthopedic Technique" "What Material? When, How and Why"
11:00-12:30	Dr. P. Brachman	Diagnosis and Chiropody Care of Muscular Distrophy and Cerebral Palsy Patients
2:00- 5:00	DR. H. E. BILLIG, JR.	"The Role of Collagenous Contractures in Foot Problems"

Sunday, March 18th

9:30-12:00	Dr. H. L. Collins	"Practice Management and Patient Control"
1:00- 2:30	Dr. J. Stern	"Ionization Therapy;" with special emphasis on the cortisone products
3:00- 5:00	Dr. M. Unterman	"Chiropody Office Administration and the Chiropody Aspect of Human Relations"

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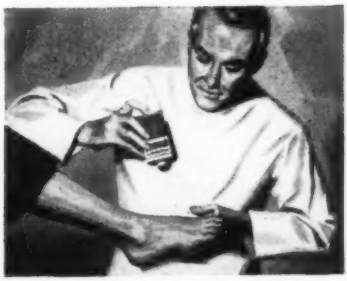

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MAN'S FOOT IN EVOLUTION*

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The terrestrial foot vs the arboreal foot and the relationship between man and the anthropoids

The story of the evolution of the human foot is the story of the evolution of man. It was the moment when some fortunate, or unfortunate, creature stood and remained erect, making of his hind limbs the only supporting column for his body, that marked the beginning of man.

When, where, and why this significant change in posture took place cannot accurately be ascertained, but it effectively produced a specialized structure distinct unto itself . . . the human foot.

"Man's foot is all his own. It is unlike any other foot. It is the most distinct human part of the whole of his anatomical makeup. It is a human specialization and, whether he be proud of it or not, it is his hallmark, and so long as man has been man, and so long as he remains man, it is by his feet that he will be known from all other members of the animal kingdom. It is his feet that confer upon him his only real distinction and provide his only valid claim to human status." (F. Wood Jones)

Foot Not Inherently A Weak Structure

The foot of man as it is constituted today is employed to withstand, lift, and transport its superimposed weight, either on one or both feet. It is remarkably adapted for this purpose, bearing within its minimum confines an intricate system which defies attempts at analyzing all its structural and functional relationships. It may not be the most perfect apparatus for its purpose, but it is certainly more than adequate.

Whatever conclusions have been reached insofar as its purpose, the function of the foot has been influenced by the evolution of man. Our interpretation of foot function has been markedly influenced by the theory of the evolution of man. This is most manifest in the belief that because of the change-over from the grasping lower limb of the anthropoid, the human foot is at present weak, and prone to many diseases and disabilities, particularly in the area of the hallux and

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the long arch, i.e., in those structures where the principal changes between the grasping and the weight supporting foot took place. It is claimed that the foot has not completely adapted itself to the role of bipedal orthograde progression and therefore is prone, under extenuating circumstances, to drop, resulting eventually in a flattened foot. The first metatarsal segment is said, for the same reasons, to be prone to hallux valgus.

Theoretically, and from experience, the writer has found that the foot is not a weak structure, either inherently or in any other wise. The human foot has been found to be a strong structure which resists all attempts of nature and man to deform and disrupt, and which is fully and remarkably capable of performing as a weight supporting, weight-bearing, and weight transmitting organ. It reserves to itself the right of any organ or mechanism to wear out eventually, but this by no means infers inherent weakness. If a weakness actually exists in the long arch, then completely flattened feet would be prevalent among the human race. The fact is that such a condition is a rarity. The so-called weakness of the first metatarsal segment, as the cause of hallux valgus has never been satisfactorily established . . . and if it was so, then the incidence of hallux valgus among civilized people should be much greater than it is. Natives, not subject to the stress and strain of shoes and unyielding walking surfaces should present this condition by the score, yet it is relatively unknown among them save as the result of direct trauma.

Since the relationship between evolution and foot breakdown as to cause and effect is inconsistent, the question arises as to whether the human foot has evolutionized to the point where it is strong enough to withstand all attempts to break it down, or whether the weakness proclaimed of it never existed . . . that the evolution of the human foot did not occur in the manner described and at present accepted. The latter question appears to be vital owing to the many inconsistencies (to be pointed out) in the present concept. The nagging thought exists that the foot is not inherently weak, that it could not have been so at any time during man's evolution else he would have had difficulty surviving as an erect biped. The foot has always been strong, capable, and sound, and must have been a weight-supporting structure from the moment man first stood erect, and has remained so ever since. It was designed by usage, and became through usage, an organ for bipedal orthograde progression and nothing else. Following this line of thought, the present concept of the evolution of the human foot, as having reverted from a grasping type, is not the true picture.

The pattern of the present theory of evolution has been one of alignment with the anthropoids. A common ancestor of both man and the anthropoids became arboreal for a considerable period of time. Then, for some undetermined reason, one of these stepped to the ground, assumed the erect attitude instead of dropping to all fours, and remained thusly, eventually to become man as he exists today. Those creatures which disdained to commit themselves to walk like men, remained aloft to continue their arboreal flights. This theory has received general acceptance although much discussion and differences of opinion exist as to which branch of the tree delivered man. Careful examination of this concept reveals many inconsistencies either not ex-

plained, or explained away. There are many gaps in the story which leave a totally unsatisfactory picture.

Inconsistencies in the Present Argument of the Theory of Man's Evolution

The main argument upon which this concept rests is the similarity in structure between man and the apes. Such a similarity, it must be admitted, is more than striking: such a resemblance in design, in construction, in appearance must be more than a mere coincidence, ergo man must have directly derived from one of the apes.

If it is the foot of man which differentiates him from all other animals, then we must look to the foot in comparing him with them. Comparative structures which resemble man's may mark the relationship which could have existed at one time between himself and others. However, if we are to study and understand the evolution of man, we must examine the structure which is distinctly different, rather than those which resemble each other, and in this manner try to determine why and how they took place.

It is quite evident that the human foot and the lower portion of the extremity of the anthropoids corresponding to it have similar structures and shapes and even have the identical number of bones. Even though these parts resemble one another, no inference of kinship should be made on this basis alone. Charles Darwin found all the bones of the human skeleton could be compared with the corresponding bones of a monkey, bat, or seal. The muscles, the nerves, the blood vessels, the viscera were similar, as was the brain, even to the pattern of its convolutions. Just because all these structures are similar does not mean that one derived directly from another.

A further similarity which is often presented as evidence to support the present concept, is the difference in the position of the viscera between all quadrupeds and both anthropoid and man. Though man's and the ape's viscera hang in similar manner, this is no indication that this was brought about in the same manner.

The terrestrial character of the changes of the gorilla foot with its comparative recent adaptation to ground living habits are claimed by some to make them, by analogy, a valuable source of information regarding the early stages in the development of the human foot. Unless it can be determined that early man had similar structural and functional characteristics to the modern gorilla, and that the change took place under like circumstances, no such relationship can be established. The argument runs in effect that changes which have taken place in the modern gorilla's foot, resemble our concept of early man, therefore early man's foot changed as did the modern gorilla's. If the foot of man was never a grasping organ (and there is no proof that it was), if man was never arboreal (and there is no proof that he ever was), then the comparison, by analogy, of the foot of early man, or even modern man, with the foot of the modern gorilla, or any anthropoid, is an artificial, illogical, impractical, and useless one to make.

The foot of man as it has evolutionized, or as it exists today, should not be compared with the present day gorilla, or any of the anthropoids since each of these progressed under separate circumstances, under different life patterns, through special individual func-

tions, and so can offer no true basis for comparison. Man, it appears, must be placed outside the pale of the arboreals.

Darwin has stated, "We must not fall into the error of supposing that the early progenitors of the whole simian stock, including man, are identical with, or even closely resembled any existing ape or monkey." We seem to have fallen into this error in supposing what the structure of the foot of preman was by comparing its evolutionary progress, backward, from that of the modern ape. For those who are convinced that man is derived from the anthropoids, it is not difficult to transpose and transform by a series of theoretical anatomic and physiologic manipulations and adjustments, the foot of the gorilla into the foot of man. But one truly wonders whether such a transformation actually took place.

The present examples of the anthropoids are end products of their evolutionary process, thus the modern chimpanzee is the evolutionary result of the primitive chimpanzee . . . and so it is with the monkey, with the ape, and with man. Each is a product of his own kind and should not be compared with one another at the existing level. The present gibbon will never become an ape, nor will the modern gorilla ever evolutionize into man.

It is also evident that man becomes more variable, but he remains man. Apes become more variable, but remain apes. It is possible that some offshoot of the modern ape may produce a new species, but it is unlikely that such a specie will approximate or be compared with, or be linked with modern man. It is also improbable that the offshoot of modern man, should there be one, would resemble or result in anything like the modern ape.

If we accept the premise that man descended directly from the anthropoids, then the farther we get away from this point, the greater should be the differences in structure. Conversely, the closer the approximation to the point where man and ape were one, the greater should be the resemblance until the structures become fused into one where ape and man meet. Therefore the foot should more and more present evidence of a grasping structure the farther back we go, with the pelvis, hip, and limbs closely approximating those of the arboreals. Yet upon examining the evidence, the direct antithesis is found.

No Missing Link Between Man and the Apes

The closer we approach the period and the point in time where man was supposed to have been one with the apes, "the missing link," we find many points of similarity although there are sharp areas and points of dissimilarity, particularly in those structures which should be most alike, namely the feet. The evidence for this is presented by the fact that earliest man discovered to date, and which is found to have the closest general characteristics of the apes, used bipedal progression. Instead of being arboreal in character, they are described as definitely having weight-bearing structures with the pelvis and the hip aligned in the position of the erect attitude.

If man descended from the trees to assume the erect posture, his feet at such a time would resemble the arboreal creature he so recently was. The weight-bearing foot could not be developed overnight. There must be a time element for the adaptation of the arboreal to that of the erect posture, and such time is not allowed for in the pres-

ent concept. This gap cannot be filled by stating simply that man descended from the apes. The evidence points away from such a link. Either we must seek further back in the evolutionary history to fill this time element, or we must reach the conclusion that no direct relationship existed between the arboreal foot and the human foot, therefore, no direct relationship existed between the anthropoids and man. It becomes increasingly evident that man evolved in a class by himself.

The Species of Man is a Distinct Entity

One cannot discount the remarkably close similarity of the simian stock anywhere along the line. It would seem logical then to seek further back on the ancestral tree of these species in order to find the point of common ancestry of the entire simian stock. This point in time must exist before any arboreal stage was reached. Darwin himself took the position that man is a co-descendant with other mammals from some unknown and lower form than that of the anthropoids. In considering the evolutionary process of man as having taken place along separate and distinct lines, as Ruth Moore has stated, "A drastic change must be made in the illustrations and the accounts of man's forebears given in nearly all textbooks and scientific volumes. A long accepted picture must be changed." In light of the recent studies and findings, the concept that man passed through the various stages of the arboreal mammals, namely the four-footed arboreal Notharctus, to the brachiating mammal or gibbon, on to the gorilla until he reached the highest form of all, becomes unacceptable.

Man's Beginning and Evolutionary Development

There existed late in the cretaceous period, or early in the miocene period a mammal which was the common ancestor of the primates. There are indications, as for instance in the lemurs, that a semi-erect posture was assumed by some. Some one of these evolved to the point where it stood erect permanently. Such a transformation did not take place suddenly. The changes which are undergone in the assumption of the erect posture from that of the quadruped would come about gradually. The assumption of this erect attitude created a new specie. When new species or varieties originate, it is not the nature of the whole organism which is changed. On the contrary, everything remains in a state of rest except at one or two points, and it is only to the changes at these points that all the improvement is due. DeVries pointed out that only after a species was created by mutation does natural selection come into play and permanent changes are made through the long slow process of selection. Man may thus be considered a mutant of a quadruped who, through natural selection was able to survive on the ground in the erect attitude.

This attitude was assumed from whatever four-footed position he had employed previously. In continuing to remain erect upon the ground, the foot evolved as, and into, a weight-bearing terrestrial structure adjusting itself with the alteration in the entire body and the environment. Man was a terrestrial creature and adapted himself to terrestrial life in the new position. Those of his clan who took to the trees either at this time, or at some later date, carried with them the same skeletal structures

but adapted them to arboreal life. Depending at what point the anthropoids separated from the human stock would determine in what manner the hind limb evolved. If it was immediate, then each evolved from the beginning on its own and in its own way. If pre-man and pre-anthropoid came along as one for a certain period of time after the assumption of the erect attitude, and then one of them took to the trees, the terrestrial foot would have to have been adapted into that of the arboreal by these creatures.

Fossil Evidence Viewed In a New Light

The acceptance of the premise that man and the apes, although of the same ancestral stock, diverged before either of them became arboreal, places the evidence gathered into a new and different light.

The fossils of earliest man discovered in the Java riverbank, recovered from the Chinese hill and dug out of the African caves reveal that these so-called "ape-men" walked very much like man and had an upright near human body long before the brain reached human size. In 1948, Broom discovered in Africa a nearly perfect pelvis in the same location where the complete skull of plesianthropus transvaalensis (considered the earliest of the ape-men) was found. After scientific evaluation, it was considered that the animal represented by this pelvis had walked on two legs rather than upon all four. Dr. Broom stated "what we can now say is that the pelvis is not in the least anthropoid, and it is nearly, but not quite human." In the light of the existing concept of evolution, this pelvis fossil is placed more nearly than any other in between the anthropoids and man, and perhaps fairly close to the ancestral stock from which man descended. Concerning the Broom fossil, LeGros Clarke reported, "the australopithecinae were in some respects definitely ape-like creatures with small brains and large jaws, and represented a simian level of development not very different from that of the modern large apes. Combined with these simian features are a number of characteristics in which they differ from recent or fossil apes, and at the same time approximate quite markedly the hominidi; these are in detail of skull construction, dental morphology, and in their hind limbs." Clarke found these limb bones more on the human side than the ape plan. He expressed the opinion that these ape-men stood and walked very much like man.

"It seems a reasonable inference that the australopithecinae either represent a group of early hominids which occupied a position quite close to the main line of later hominid evolution, or else they represent only slightly modified descendants of such a group." (Clarke)

There exists here an inconsistency which is left unexplained. These ape-men, earliest representatives of man, had a brain capacity of the anthropoids as well as other simian features, and at the same time were already so far advanced along the human way as to walk almost like humans, and to have developed other distinctly human characteristics. If, at or near the point where there should be an approximation of the characteristics of man and the anthropoids, for this is where man was supposed to have become terrestrial, we find evidence that man stood erect and walked erect while his supposed sibling was still arboreal, then there can be no direct link between the

two. Man's foot indicates a long period of erectness and terrestrial existence. *The only explanation of the presence of such an advanced foot is the split before arborealization.*

Weidenrich in 1941 wrote, "little is known about the development of other parts of the skeleton, but it can be taken as definitely established that the erect posture and all that is connected with its adoption was attained long before man reached his definitive form."

Brachiation and Man's Upright Posture

Man's upright position is said to have been brought about by brachiation when, after having become arboreal he assumed the erect posture by hanging from the branches just as the modern gibbon does. The changes in the fundamental body posture, including the much publicized viscera, are said to be induced by the pull of gravity. Morton has noted that the changes in posture resulting from brachiation are shared alike by the great apes and man, and except where prolonged existence in the trees has over-emphasized these changes in the former, their progress has been similar to human modifications. Morton has arrived at the following conclusions: that the upright position of the body demonstrated by the gibbon was first acquired by arboreal anthropoids through the development of brachiating habits; that the portion of the pro-anthropoid group representing the original members of the human stock adopted ground life as erect bipeds sometime during the miocene period, after their upright arboreal posture had been definitely established by structural and neurolgic changes. Finally, that the semi-erect posture of the great apes, is a reversion to quadrupedalism caused by overdevelopment for brachiation. If the last be so, then how can we compare the foot of the great apes, reversion to quadrupedalism with the foot of man which is that of the erect biped?

F. Wood Jones states, "the more primitive primates share in the general mammalian birthright of having the legs longer than the arms. Man also shares this birthright. If the human stock had ever risen from the anthropoids stem it must have passed through a phase in which the arms were longer than the legs, for this is the hallmark of the anthropoids as we know them. That man in his evolution passed from a leg-longer-than-arm stage to an arm-longer-than-leg phase, and then back to his final and primitive leg-longer-than-arm state is a very unlikely phylogenetic story indeed."

There need be no mystery in this regard, for if man was never arboreal he never brachiated, but started out originally with legs longer than arms and continued with them in the relation they are in now. It is interesting to note that many of the early anthropoids have long legs and short arms, indicating some form of terrestrial existence. The shift from the erect, more human-like posture to that of the arboreals would reverse the procedure and indicate that the anthropoids descended from man.

The form of Dryopthicus rhenanus indicates that the miocene pro-anthropoids were more erect in their habits than the modern apes. Further evidence that the more fully upright posture is more primitive than the semi-erect posture of the great apes is that the gibbon, most primitive of the apes, runs quite erect on the ground and on the branches of trees. The significance is that the upright posture

appeared in pro-man and pro-anthropoids, and that this postural state was altered by those who changed their environment. The erect attitude maintained by pro-man and pro-anthropoid may be interpreted as indicating a stage to which these animals had already advanced. It illustrates that the erect attitude existed before brachiation and could not have been its result.

The Assumption of the Erect Attitude

Circumstances and conditions other than brachiation may be responsible for and produce erect posture. It is logical to assume that the branch which became arboreal could do so only where there were trees, and most likely in forest or jungle where vegetation was thick and lush, and where food was not difficult to obtain. These creatures were not carnivorous. It is in such areas where they are found today and in all the eons not one has deserted or ventured out of its original habitat. The impetus for man to descend from the trees, and others seem to feel the need for establishing such an impetus, seems to be lacking. Sufficient food and more than adequate protection against dangers would appear to mitigate against such action. It is peculiar in this respect that there are many species of anthropoids, and only one of man. If man descended from the trees, why have not other types? If we look at it from the point of view that man and the anthropoids have spread out from one source, then man is not a separate unit but one limb of a many limbed tree.

The impetus which may have caused the progenitors of man to have stood erect could have been the environment in which this creature, perhaps rather suddenly, found himself. It was most likely a treeless, or practically treeless one. In such circumstances food would not be directly at hand and would have to be sought after. The type of diet would of necessity be changed thus altering the dentures of the creature. Danger from other animals would not come from sudden attack with little or no warning, but because of the relative open areas, could be sensed and observed sooner. This would create greater dependency on many of the senses previously not employed, particularly the eyes. Therefore, in order to protect himself, in order to better look for food and attack it, (with sparse vegetation he would eat other and smaller animals) the pre-man, more active perhaps than others of his kind, or with a spark of inquisitiveness or intelligence unknown to any other, realized that by rearing upon his hind legs he could see much farther, and that this was a distinct advantage. After many such attempts, voluntarily made, he was able to assume and maintain this position for longer and longer periods forming a habit pattern which eventually produced the changes associated with this new attitude . . . with terrestrial erect posture. In this position the head would have to turn downward in order to face forward. With the greater freedom thus permitted the head in its new position, and since it could rotate more freely, the eyes changed their position and the skull changed its shape. The viscera descended or assumed a state relative to its new position. The hands freed of the ground could now be employed to other uses.

The appearance of the ancestor of man other than in a jungle seems a strange consideration, yet it is not inconceivable. Outside of mutation and natural selection, another means of originating a new

species takes place by geographical isolation of a group of animals from its fellows. Such a group would take a separate evolutionary course by division and separation. By wandering, drifting or being carried by some act of nature; by being driven by enemies or through lack of food, these progenitors arrived at a new environment. Dart and Broom felt that the land inhabited by australopithecus and his relations had been a desert. The fossil discovered by Dart goes back to the upper pliocene period, two million years ago. The very fact that earliest man was discovered in an environment considered to have been desert would indicate the absence of any anthropoids. One would hardly expect to find men, so closely allied to the apes, as to be termed ape-men in an area barren of anthropoids and their arboreal environment.

If man did not have to brachiate to assume erect posture, and since the attitude had been firmly established with him at a time when he was supposedly still brachiating, then the time element of man's evolution must be set farther back in the scale of time. Recent studies of the age of the earth and the age of fossils have illustrated that man's evolutionary period is less than has been hitherto believed, and is shown to be very short indeed. The question has been raised as to how he managed to evolve as he has in the shorter time set by the new dating, bearing in mind the differences between man and the apes. But if man did not have to go through the period of brachiation even with the shortened period of time, he could have evolved in the time at present allotted to him.

Anatomic and Physiologic Changes In Assuming the Erect Attitude

The change to the erect attitude occurred gradually from that of the quadruped, to one which assumed the erect attitude only on occasion, then more frequently until the partially erect state was maintained, and finally the arrival at the permanent state of erectness. The earliest changes no doubt would have to have been a stretching of the joint structures in the pelvis-hip area preparatory to realignment, and the more permanent alterations.

A quadruped raising itself upon its hind limbs in order to maintain the upper portion erect must flex at the knees. In this position the hips are adducted. As man grew more and more erect, as the vertical line drawn through his body became straighter and straighter corresponding to the center of gravity, as the forces required for this new method of propulsion were fashioned, it became necessary to draw the lower limbs closer to the body. The hips had to be adducted and rotated inward, for in this attitude the leg would be straightened in a forward direction and the foot would then be pointed forward. This attitude would also provide a firmer base for the pelvis and the torso above it. This adduction of the hip and in its rotation overcame the flexion at the knee joint, and of more importance, the torsion thus applied to the foot forced it to supinate upon itself since it was bearing weight at this time. There was, therefore, a piling up of the bones of the inner side of the foot upon those of the outer side, or as it has been termed, the formation of the long arch.

Phylogenetically, the changing site of the weight center marked the evolution of standing posture

and mode of locomotion. As Steindler has written, "The backward displacement of the weight center such as exists in the kangaroo or in some of the reptiles (as in the brontosaurus), which is placed close to the posterior extremities places a great amount of weight on these hind legs. These animals are in much better position to raise themselves up and many developed for this purpose a heavy tail which they used together with the hind legs as a sort of tripod support. These changes and variations are intimately connected with the animal's living habits and the problems of existence."

The feet of dinosaurs and other active reptiles were heelless. Since these animals required no grasping with the feet for terrestrial locomotion the flexor muscles to the digits became employed as the major means of propulsion through their bow-string action against the lower end of the leg bones. As a result, in the course of their evolution, the feet were lifted into a digitigrade position without the development of the heel. However, once the upright posture was assumed, and in order to maintain this erectness, there was a necessity for exacting a special development of the extensory muscles of the trunk, hips, knees, and ankles. The evolution of muscles therefore proceeded, moving backward in the foot making of the calcaneus an important bone.

In the mammalian foot, the fibulare of the reptile has been prolonged posteriorly in a manner to form a true heel. The location of this calcaneal development in relation to the mid-line of the foot, and the completely superimposed position of the talus is said to possess arboreal significance; the arrangement being ideal for climbing movements. The digital flexors are occupied in a clinging grasp, while the muscles attached to the calcaneum are employed for directly upward leverage against the weight of the body. This would be true if the foot were a grasping structure with long digits and highly flexible. Such an arrangement would be equally as effective for a weight-bearing structure such as man's, where instead of the digits employed for grasping the limbs of trees, they could be used for grasping the ground in walking with the muscles attached to the heel still employed in raising the body. The heel with its superimposed talus was the beginning of the drawing together of the foot, for if we think in terms of the erect posture, the necessity for the formation of a heel becomes important. It is essential that the body be lifted if propulsion is to take place. Therefore, the attachment of muscles to the heel for this purpose was necessary and developed. Where the body as a quadruped has its weight distributed over four extremities, propulsion can be performed without raising the body. In the erect attitude the body must be lifted and in order to do so, muscular attachment to the heel is required to perform this act. The resultant changes in foot structure and function are based upon these two main actions and can be followed through. In so far as the digital flexors are concerned, they were employed not for grasping the limbs of trees, but for hugging the ground so that the foot could be a solid base for the raising of the body.

The significance of this heel development, the difference between the primitive mammalian foot and the primitive reptilian foot, shows a general refinement throughout its skeletal parts. The

tarsal bones interlocking so firmly as to convert the foot into a much more effective working unit illustrates the fact that the structure was on the way to becoming, or able to become, a weight-bearing unit.

The first metatarsal segment is another bone of contention in the evolutionary picture. The fact that it is divergent in the anthropoids, which is necessary if the animal is to employ it for grasping, and almost parallel in the human foot which makes of it an excellent weight-bearing and propulsive mechanism, is considered of great significance. Much attention has been placed on the realignment of the hallux. It is claimed that the hallux in relationship to the rest of the foot is inherently weak and produces various deformities. The principal among them is hallux valgus.

In those creatures who bear weight more than others, and particularly in man, the hallux is stronger, stouter, and less divergent. The farther back we go into the tree of the anthropoid, the closer the hallux gets to the remainder of the metatarsals. The foot of the human found in an imprint dating back at least 15,000 years is similar in all respects to the imprint of the modern foot.

In order that the foot be a truly supportive structure, its parts must be closely knit, interlocking with a minimum of motion. A foot with a divergent independent hallux would not fit this picture and if it were present nature would have attempted to alter it. However, it was not there to begin with, the reptile becoming the mammal, and from the mammal a direct line of descent into man. When the anthropoids separated from the human and its foot became a grasping one, such a divergence of the hallux was necessary.

Summary

1. Man is a distinct entity to himself, having no direct relationship with the anthropoids save some common ancestral stock from which both derived.

2. Man became a bipedal orthograde propulsive creature when he assumed the erect attitude direct from a four-footed position.

3. Man was never arboreal.

4. The foot of man was never a grasping object, and never had to make the change-over into a terrestrial weight-bearing one. It was terrestrial from the very outset.

5. The foot of man cannot, and should not, be compared with the feet of the anthropoids, either fossil, ancient, or modern.

6. The foot of man was terrestrial from the start, and as such grew and was formed into a strong weight-bearing medium, by far not the best, but by far capable of serving its purpose.

7. The foot of man is a strong functional unit and not subject to certain inherent or evolutionary disturbances.

8. The foot of man is not weak because of the supposed changes which took place as the result of evolution as presently conceived.

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FACTORS AFFECTING PAIN OF INJECTION

THE AUTHOR maintains that "given a nonirritant solution, pain of injection is not inevitable" and proceeds to specify details of a technique to eliminate pain. Skin pain can be eliminated by application of cold to the injection site by spraying a "coolant" mixture 15 per cent of which was dichlorodifluoromethane and 85 per cent trichloromonofluoromethane. This mixture was not so cooling as ethyl chloride. Experiments showed that anesthesia to insertion of the needle was present when the skin surface temperature dropped to 32° F. (0°C.) two or three seconds after spraying. The spraying did not affect antisepsis of the already cleansed skin, when injection is made the instant the solution evaporates and the skin appears dry. Subcutaneous pain was reduced but not entirely eliminated by addition of a local anesthetic to the solution. Venous pain was minimal if a sharp needle was "neatly introduced into the vein" and if a locally irritant solution was to be injected, by doing so at a slow rate to permit dilution by the blood or by use of 1 or 2 per cent procaine solution as antidote in the case of an alkaline solution. Careful palpation of the muscle before injection aided avoidance of injection into "trigger" areas.

J. Travell, J. Amer. Med. Assn., vol. 158, pages 368-371, June 4, 1955

REPORT OF SURVEY ON 10,155 PATIENTS FOR THREE CONDITIONS

EMIL S. BURGER, D.S.C., F.A.C.F.O.*
Chicago, Ill.

THE Scientific and Research Committee of the American College of Foot Orthopedists has completed a statistical survey of the histories of 10,155 patients on three common pathological conditions treated in the offices of the practitioners. The pathological conditions were as described in the following paragraphs.

Condition Number One

Hypertrophy in the area of the fifth metatarsal phalangeal articulation. The degree of pain, inflammation or callosity is not material to this survey. Synonyms, not endorsed, are Tailor's Bunion or Bunionette.

Condition Number Two

Sesamoiditis, including all patients with a diagnosis of periostitis, osteitis, periostoma, or bursitis on sesamoid area plantar aspect of first metatarsal.

Condition Number Three

Osteitis, periostitis, periostoma or bursitis in the region of the plantar aspect of the heel.

Results of The Survey on 10,155 Patients

Total number of histories examined (patients)	10,155
Number of male patients	3,419
Number of female patients	6,736
Percentage of male patients	33.6%
Percentage of female patients	66.4%

Classification of age groups	Number	Percentage
Birth to 10	610	6.0%
11 to 20	1,095	10.7%
21 to 40	2,852	28.0%
41 to 60	3,559	35.0%
Over 60	2,039	20.3%
Total	10,155	100.0%

Pathological Findings

Total number of patients with pathology	2,840
Number of male patients	881
Number of female patients	1,959
Percentage of male patients	31.0%
Percentage of female patients	69.0%

Condition Number One

Total number of patients	1,184
Number of male patients	348
Number of female patients	836
Percentage of male patients	20.7%
Percentage of female patients	79.3%

Condition Number Two

Total number of patients	1,117
Number of male patients	272
Number of female patients	845
Percentage of male patients	24.3%
Percentage of female patients	75.7%

Condition Number Three

Total number of patients	539
Number of male patients	261
Number of female patients	278
Percentage of male patients	48.4%
Percentage of female patients	51.6%

*Chairman, Scientific-Research Committee, The American College of Foot Orthopedists.

Condition Number One

Total number of patients	1,184
Unilateral	617
Bilateral	567
Percent Unilateral	52.2%
Percent Bilateral	47.8%

Condition Number Two

Total number of patients	1,117
Unilateral	731
Bilateral	386
Percent Unilateral	65.5%
Percent Bilateral	34.5%

Condition Number Three

Total number of patients	539
Unilateral	392
Bilateral	147
Percent Unilateral	72.7%
Percent Bilateral	27.3%

Age Groups Classified As To Pathological Conditions

Condition Number One

Age Group	Number of patients	Percentage
0 to 10	37	3.1%
11 to 20	114	9.6%
21 to 40	307	25.9%
41 to 60	476	40.2%
Over 60	250	21.2%
Total	1,184	100.0%

Condition Number Two

Age Group	Number of patients	Percentage
0 to 10	33	2.9%
11 to 20	101	9.0%
21 to 40	354	31.6%
41 to 60	404	36.1%
Over 60	225	20.4%
Total	1,117	100.0%

Condition Number Three

Age Group	Number of patients	Percentage
0 to 10	39	7.2%
11 to 20	65	12.0%
21 to 40	136	25.2%
41 to 60	221	41.0%
Over 60	78	14.6%
Total	539	100.0%

This report is one of the completed projects of the American College of Foot Orthopedists. The Scientific-Research Committee has several projects in progress and when they are completed, the final reports shall be presented.

2543 South Avers Ave.

CONTINUOUS MEDICAL EDUCATION

THE medical schools cannot be all things to all people and I believe we are fooling ourselves if we think that the conventional four-year curriculum will result in a "compleat" physician. It is my opinion that we must now think of the "forty-year educational experience," only the first four years of which are spent in continuous residence in the school of medicine. These first four years must be designed to provide the physician with a basic foundation—principles, if you will—on which he may continue to build during the remainder of his professional life. I am much more interested in seeing that a medical student understand the basic action of a particular drug than that he be familiar with which drug company sells what brand. If the student has the idea that he has only four years in which to learn all of the things that will make him a finished physician, he is inevitably going to seek practicality at the expense of a firm and strong scientific foundation. If, on the other hand, he can be indoctrinated with the idea of continuing medical education, it will be much easier for him to understand the need for basic physiology, pharmacology, biochemistry, etc.

Franklin D. Murphy, California Medicine

RADIOGRAPHIC INTERPRETATION OF NORMAL BONE IN THE LOWER EXTREMITIES*

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THE USE OF radiography as a diagnostic aid in chiropody is an invaluable addition to our armamentarium of scientific tools for evaluating clinical findings in search of a true diagnosis and treatment program. We are indebted to such men as Gamble, Yale, Jablon, et. al., for their pioneering efforts in the field of Chiropodical Roentgenology and their success in fostering interest and research among their colleagues.

Just a few short years ago, the practice of diagnostic radiography was confined to a relatively few highly trained specialists, not only in chiropody, but in medicine as well. The mode of practice has progressed with tremendous strides and now occupies such an important position in clinical medicine that it is now recognized that some knowledge of the fundamentals of radiography is a requirement for any progressive modern chiropody or medical practice. With the development of the "Standard Foot Positions in Roentgenology" by Felton O. Gamble, D.S.C., in 1939, chiropody has a technique that is universally accepted throughout the country by all progressive practitioners. This method is taught in our recognized schools of chiropody as part of the radiographical training.

Proper evaluation of a radiograph requires a complete understanding of normal osseous tissue. Knowledge of the embryological, histological and physiological aspects of normal bone is essential to avoid error in interpretation of the image. Having been firmly grounded with an understanding of normal bone, the diagnostician runs a lesser risk of "reading into" a film or pondering on observations that are of no significance or merely normal variations.

Developmental Considerations

Embryologists describe evidence of development of the extremities, in the human embryo, as early as the third week of gestation. Limb buds have been seen then—as outgrowths of mesenchyme evaginating behind ectoderm. The mesenchyme of these outgrowths extend from the sclerotomes and the myotomes which primarily are concerned with the spinal segments. These extensions follow a definite pattern; the outgrowth destined to form the lower extremities extend from the twelfth thoracic, the five lumbar levels and the four sacral segments.

Nerve fibrils grow out from the several spinal ganglia and spinal cord substance and penetrate the sclerotomes and myotomes which are precursor tissues; progenitors for bone and muscle, respectively.

In the beginning, the mesenchyme is a very loose structure. As it extends into the limb buds, the rate of its cellular development differs in various portions of it. In some areas, growth is rapid and tissues compact, producing rod-like masses. These masses are known as pre-osseous structures. Within these rod-like masses, the rate of cellular growth varies at certain levels. In some regions, there is complete

*American Society of Chiropodical Roentgenology, 1955 Annual Thesis Award Winner, Temple University, School of Chiropody.

failure of cellular development. These are the regions of cleavage between bones and sites of joint formation.

As early as the fifth week of intra-uterine life, the extremities of the fetus can be identified as substantial finger-like processes. Thus, distinction is apparent between thigh, leg and foot segments. Already, some degree of joint formation between these segments can be noted. At this early stage, the terminal extremities are somewhat flattened and rounded, more or less as discs. Retardations of cell growth occur lengthwise in the substance of mesenchymal rods and eventually longitudinal cleavages result, thereby accounting for the integration of the two bones of the leg, tarsals, metatarsals and phalanges. Cleavages through the soft tissues of the disc-like terminal, occurring about the seventh week, produce actual separations of the toes.

With complete retardation of cellular growth at the sites of future joints, the freely movable or diarthrodial joints are produced. At the interphalangeal, metatarsophalangeal, tarsometatarsal and tibiotalar levels, complete spacing between the mesenchymal segments can be noted.

The Development of Bone

All of the bones of the extremities are cartilaginous bones. Prior to the development of true osseous structure, the pre-osseous mesenchyme must be transposed into cartilage. This transformation begins as early as the fifth or sixth week of fetal life. Shortly thereafter, a second transformation takes place —that of cartilage to bone.

These transformations usually take place very systematically. These changes first occur in the centers of the respective pre-osseous structures. For instance, as the mesenchymal rods become clearly distinguishable, the cellular structures, in their central portions, become especially compact and one or more islands of cartilage develop. These gradually expand to include the entire bulk of the rod. The transformation of cartilage into bone develops in a similar manner.

All long bones are first delineated by masses of cartilage as described above, and later replaced by bone. This is known as intercartilaginous or enchondral ossification. The ossification of the cartilage in enchondral bone formation begins at one or more points which are called centers of ossification: one from which the diaphysis or central portion is formed and one at each end for each epiphysis. The epiphyseal centers make their appearance much later than the diaphyseal center, and are formed from an extension of marrow from the primary center of the shaft. Primary centers appear early in intra-uterine life; secondary centers, with few exceptions, develop after birth, and form the epiphyses.

In the shaft, the process of ossification progresses steadily and quite rapidly. This continued absorption soon breaks down and removes the trabeculae and partitions of spongy bone, and forms a central medullary cavity of constantly increasing size. Coincident with these changes within the cartilage, the osteogenic tissue, which forms the inner layer of perichondrium, produces successive layers of bone tissue upon the surface of the fetal cartilage (perichondrial ossification).

During the process of enchondral and perichondrial ossification within the shaft of the bone, the epiphyseal cartilages continue to grow. Eventually, osteogenetic tissue invades this region from the primary center of the diaphysis, and spongy bone formation occurs

in similar fashion to that already mentioned. Some of this is absorbed and replaced by more compact bone.

At the line of junction between the expanding centers of ossification of the distal portion of the shaft, known as the metaphysis, and the epiphysis, a line of unossified cartilage persists until adult life. It is by growth of this cartilaginous disc, the epiphyseal plate, with continued formation of cartilage mainly on the surface of the shaft, that growth of the bone in length takes place. These changes occur normally according to a rather well-defined pattern, and a person's "bone age" can often be told radiographically up to about the early twenties.

It must be remembered that the epiphyseal plates are not flat and disc-like, but have many irregularities. This is a protective mechanism for the prevention of fracture with slight trauma, since these irregularities represent invaginations of the cartilage into bone. The appearance of epiphyseal end plates is frequently confusing and comparison views with the normal side are usually necessary in questionable cases to make certain that the structure is within normal limits.

Systemic diseases sustained by individuals during the growth period may produce a temporary cessation in the growth of a long bone, and when the growth is resumed, a transverse band or line remains for a considerable period of time. Heavy metals (bismuth) will also be selectively deposited at the zone of most active growth in the shafts of long bones, leaving similar testimony of their presence for life. Pure arrest lines are finer and less perceptible than those lines caused by deposition of heavy metals.

Microscopically, bone in cross section is either spongy or compact and usually the two types are found in contiguity with one another. In the shaft of long bones, there is a cancellus inner portion adjoining the medullary cavity and an outer dense portion forming the cortex. The cortex is thickest at the midshaft and becomes a very thin layer at the epiphyses. The spongy central portion contains numerous small chambers, having the appearance of a network of trabeculae when viewed with the naked eye which increase quantitatively toward the metaphysis of each long bone. This spongy or dense appearance of bone is readily detected on the radiograph, and contributes to the normal appearance of bone throughout the body.

The periosteum, however, is not normally radiopaque because it is not calcified and offers no contrast to the overlaying structures. This outer bone covering is actually divisible into two layers, an outer fibrous layer to which muscles and ligaments attach, and an inner osteogenic layer made up of fine elastic fibers which are attached to the cortex by Sharpey's fibers.

Microscopically, compact bone consists of four different types of lamellae:

1. Concentric lamellae of calcified fibrous tissue which constitute each Haversian system. Each system contains a minute central canal, Haversian lamellae arranged in parallel layers and numbering four to twenty; small ovoid spaces both in and between the lamellae known as lacunae; canaliculi, which are myriads of small canals radiating in all directions from each lacuna.

The central canal contains connective tissue, marrow cells, blood vessels, nerve fibers and perivascular lymphatics. The lamellae are filled with a solid calcareous mass, chiefly the phosphate (about 80%) and carbonate of calcium. The or-

(Continued on Page 105)

JOURNAL

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BY THE NATIONAL ASSOCIATION OF CHIROPODISTS

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Address all communications intended for publication, matter relating to advertising, business or subscriptions to the Editor.

PRESIDENT'S MESSAGE

A RECENT LETTER received in my office from one of our colleagues complimented the "Eager Beaver Message," of a few months ago. He was impressed and wanted to reprint the entire message in his State publication.

An Eager Beaver in my books is one who sits around and criticizes the other fellow's efforts. He will not willingly lend a hand to organizational activity, but would rather jump in after the work is done, and then attempt to outshine others by his individual and personal attempts to supersede. Such blundering will have to be completely and positively stopped, by members of our Profession.

In the past our State committees have not co-ordinated their activity with a National committee, and part of our new organizational set-up is geared to overcome this. In the past we've often heard the lament "What is the N.A.C. doing for us?" As of this date that question and attitude is obsolete. I'm requesting our Editor to print in the JOURNAL the Committee Chairman's name and address, for all National Committees. Part of their job will be to assist and cooperate with your State chairman.

A recent appointee, Dr. Plaster of Missouri, will head our Publications Committee. Part of his job will be to send to our N. A. C. JOURNAL such items gleaned from all State Publications as may be of interest to the membership at large.

How about having lunch with some of your own colleagues today? You'd be surprised how interesting shop talk with men of your own Profession can be over a luncheon table.

RALPH E. FOWLER

DONATIONS FOR TREATMENT AND RESEARCH

THE ANNOUNCEMENT at the bottom of the next page reminded your Editor of some data he read recently that was quoted from the Insurance Research & Review Service. This data is for 1954 and shows the amount

of money donated for both treatment and research in certain diseases compared with the number of victims of each disease. We have arranged this data according to the number of victims.

	Millions Donated	No. of Victims		Millions Donated	No. of Victims
Arthritis & Rheumatism	$ 2	10,000,000	Cancer	$24	700,000
Heart	12	10,000,000	M. Distrophy	4	150,000
TB	25	1,200,000	C. Palsy	8	550,000
			Polio	67	70,000

An obvious and distressing omission is the amount of money donated for foot health and research compared with the number of its victims. Surveys tend to support the contention that over 70% of the population have foot problems. However probably only 35 to 40% of the population have symptoms that make them seek immediate attention. This would place foot problems at the top of the list with approximately 50,000,000 victims as a most conservative estimate. Obviously the amount of money donated for research and treatment for particular types of diseases is not related, except in reverse, to the number of victims. Certainly one of the reasons why there is so little donated for foot problems is the lack of morbidity associated with foot problems. However, this table indicates that morbidity is not a paramount factor.

We are all familiar with the coin collecting canisters associated with all the various appeals for funds. In fact, a great many of you have probably had one or more of these in your reception rooms. Would not the American Foot Health Foundation be an excellent recipient for such collections from your office? In addition to bringing in funds to promote research in foot health, it would inform your patients and visitors that there exists such an agency. And who is more likely to be interested in foot health research than the foot sufferer!

Your Editor recalls several years ago knowing a physician who had a similar canister in his waiting room behind a placard adorned with "For a Deserving Youngster." You would be surprised at the size of his son's bank account.

FOOT HEALTH WEEK — MAY 11-18, 1956

THE SECRETARY'S office has received numerous requests concerning the dates for National Foot Health Week this year and for information and assistance on the program.

This announcement is to remind the members at large and particularly the various Foot Health Committee chairmen that the American Foot Health Foundation has assumed sponsorship for National Foot Health Week and that correspondence directed to Dr. Sidney Hirschberg, President, 107-07 Continental Avenue, Forest Hills, New York, will produce the information and assistance they wish.

THE USE OF OPAQUE MEDIA IN CHIROPODICAL ROENTGENOLOGY*

KERMIT CALMENSON, Pod.D.
Brooklyn, N. Y.

ONE of the basic requirements in roentgenology today is recognition of the fact that, as stated by Rhinehart. "When natural difference in density does not exist, it is often possible to create an artificial difference that serves the purpose quite as well. Perhaps the best known of these expedients is the addition of barium sulphate to the stomach and intestinal contents, thus making these organs opaque to x-rays."

The field of physical diagnosis has been dramatically widened through the utilization of various opaque media in roentgenology. These include those media which are more dense as compared with regional tissues, e.g., barium sulphate, iodized oil, diodrast, pantopaque, etc., and those which are less dense, such as air and oxygen.

Since experimentation and progress are intimately related, this paper reports methods and materials employed, and results obtained, in the utilization of radiopaque substances when applied specifically to various areas and tissues of the foot.

For one example, non-toxic lead aquaphor ointment, consisting of 8 gm. powdered white lead mixed into 6 gm. aquaphor base, may be massaged into the skin with a gauze pad, in cases where it may be desirable to bring out on the x-ray plate such features as the depth and extent of skin lesions or cracks. This technique will produce plates which clearly show heel fissures, skin lines and creases, and the line of the plantar metatarsal crest, as well as showing the location of the plantar base lines of the toe webs. (This lead ointment is extremely injurious to the standard film holder, and one may economically improvise a film holder of aluminum foil with lead body.)

Although experiments have been made chiefly with radiopaque media principally employed in medical x-ray techniques, it has been found that a medium which is widely used in dentistry also has a definite place in chiropodical roentgenologic technique. Figs. 1 and 2

Fig. 1

illustrate the use of gutta percha points and plugs, which dentists have been using for many years to fill root canals and which, when filmed, act as excellent contrast media. The gutta percha points, which are available in various sizes and shapes, may be used to delineate the shape, size, and location of a nail groove, on x-ray film. In Fig. 1, showing a narrowed nail

*Condensation of an award winning paper in the 1955 N.A.C. Research Awards.

groove prior to acrylic therapy, the gutta percha shows clearly the pre-treatment size of the groove, as contrasted with the size of the groove after treatment (Fig. 2).

Fig. 2

The technique consists of selecting and inserting in the groove a gutta percha point which is long enough to fill the entire length of the groove, with the width of the point likewise approximating the width of the groove. After warming the gutta percha to malleability, it should be touched to the operator's forearm to make sure it is not too hot, then it is packed into the groove to duplicate as closely as possible the position which the acrylic resin will take. The toe is then x-rayed, after which the point is removed, and the groove is packed with acrylic resin according to standard chiropodical procedure.

Subsequently, when the patient returns, another radiograph is taken. This time white-base gutta percha is used in place of the points. A gutta percha "plug" is cut long enough and wide enough to fill the space that is left on removal of the acrylin resin. The plug is handled similarly to the point, and is used because of its greater bulk. Before-and-after films of this type are of value in graphically recording progress of treatment.

While treatment of onychocryptosis is a routine matter, it is felt that clear radiological visualization of the pathology in selected cases might be helpful in the prevention of recurrences. Experimentally, radiopaque iodochlorol has also been employed with good radiological and therapeutic results in cases of onychocryptosis. As iodochlorol has a specific gravity of 1.23 to 25°C., and is thus heavier than the purulent secretions present in infected cavities, it gravitates to the bottom, displacing the purulent matter. Therefore, after removal of the ingrown portion of the nail, iodochlorol is placed, by means of a medicine dropper, into the groove, and the toe is x-rayed. The resulting film will show the direction of nail penetration, whether laterally, medially, or anteriorly. Such graphic delineation of the area affected enables a more knowledgeable and efficient application of

Fig. 3

follow-up treatment, including acrylic therapy.

Radiography of hypertrophied nails (whether simple onychauxis, onychogryphosis, or onychomycosis), to determine thickness before and after treatment, has also been

Fig. 4

attempted, as have similar studies of helomata. Results of such studies, using some of the previously mentioned radiopaque materials, were unsatisfactory, and it was found that the use of lead foil in such cases gave more accurate pictures of both overgrown nails and of helomata. A thin piece of foil is smoothed over the nail and the toe is x-rayed, before and after burring and curetting. Fig. 3 illustrates an x-ray picture of a thickened nail, as obtainable by this method. In order to visualize transparency of the nail, foil of .0004 thickness is used, whereas where a silhouette of the nail is desired, the backing of the D-1 dental type film is used.

If it is desired to visualize radiographically a heloma or other surface lesion, a helpful technique consists of outlining the excrescence with an indelible pencil, transferring the pencil mark to the sticky side of adhesive tape, and cutting a piece of lead foil to fit the pattern on the tape. The foil is then adhered to the skin with rubber cement, and x-rays are taken in routine manner to obtain radiographs showing helomata in relation to surrounding tissues and to deeper structures. Figs. 4 and 5 show the precise location and size of a heloma on the side of the big toe, before and after latex shield therapy.

Fig. 5

Summary

This paper is a discussion of the use of various radiopaque materials as helpful adjuncts in chiropodical roentgenology. Although no conclusions are drawn concerning the ultimate diagnostic and possibly therapeutic value of the methods described, it is hoped that the techniques may lead to more intensive x-ray diagnosis and perhaps, ultimately, to wider areas of therapy in the field of chiropody.

1 DeKalb Ave.

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RADIOGRAPHIC INTERPRETATION OF NORMAL BONE IN THE LOWER EXTREMITIES

(Continued from Page 99)

ganic substance of bone consists of collagen, osseomucoid and small amounts of other albuminoid substances. When bone has lost its mineral content, it becomes tough, flexible and elastic and is classified radiographically as decalcified, while when freed of all organic matter, it becomes brittle, rigid and hard and is termed sclerosed.

2. Groups of lamellae interposed between adjacent Haversian systems or parallel to these. These interstitial or ground lamellae are traversed by branches from the Haversian system, these branches being known as Volkmann's Canals.

3. Outer basic lamellae beneath the periosteum.

4. Inner basic lamellae. This is termed the endosteum or medullary membrane, separating the cortex from the medulla.

The bone marrow contained in the medullary spaces consists of connective tissue, fat, blood vessels, nerve fibers, all the hematogenic elements of blood and osteogenic elements as well. Yellow marrow consists mainly of fat, and thus differs from the red marrow.

Normally, bone marrow is diaphanous or translucent in a radiograph. Bone tumors may be seen radiographically as an increase in density, while cavitations affecting the bone marrow will be seen as an area of loss of density.

X-rays do not penetrate all matter with similar ease. Radiolucency refers to matter which is penetrated by X-rays with relative ease, whereas radiopacity is descriptive of matter in which the rays are absorbed in great measures. Bodily tissues vary in their opacity and appearance on a radiograph plays a most important role in the science of radiography. The most radiopaque substances of the body are bone calcium salts, while gases, fatty tissue and cartilage are the most ray-transparent. The cartilage, when contained in bone or extending from its extremity or periphery, is usually discernible. It usually presents the appearance of "window-defects" within the bone, or spacing at the extremity of it, or on its surface. Thus, the presence of solid cartilage may not be fully appreciated in the case of cartilaginous rests; enchondromata, ecchondromata, osteochondromata. Similarly, there is oftentimes a disregard as to the presence of the cartilages which normally cap the extremities of bones — the articular cartilage. There is the tendency to describe the radiolucent areas between the ends of bones as "joint spaces."

Visualization of one or another tissue depends largely on kilovoltage; hence, it is the factor most specifically concerned with tissue differentiation. The best kilovoltage for bone is the 40-70 range.

In addition to the extra bone formations which may develop by way of extra segmentations of mesenchyme or by additional splittings of the pre-osseous rods, there are the more common "supernumerary bones," those frequently described as ossicles or as sesamoids. An ossicle is an unattached fragment of ossification belonging to a particular bone (os trigonum). A sesamoid is a distinct bone. Occasionally, a sesamoid has an ununited fragment — i.e., an ossicle. Ossicles are located immediately adjacent to the bone with which they belong. Sesamoids are located in a tendon, ligment or in the belly of a muscle (patella).

Especially where a case may be a possible fracture, these bony fragments may easily lead to confusion. Too often, they are described as fracture fragments. Avoidance of error is accomplished by the following facts — the borders of ossicles are smooth (those of fractures are usually rough); a distinct cortex can be distinguished throughout their peripheries (whereas the outlines of cortex are lacking on the surfaces of bone adjacent to a fracture); ossicles are frequently bilateral, or at least multiple.

Sesamoids more definitely warrant the term "supernumerary" (or accessory) bones. They function as distinct bones, usually so as to facilitate the gliding action of a muscle or tendon.

The Cortex

This structure is dense homogeneous bone bounded by the medullary reticulum on the endosteal surface and by the soft tissues on the periosteal surface. Calcification which may be deposited beneath the periosteum is not to be considered as cortex or thickening of cortex when it is distinguishable from normal cortex in any way. Only when there is no distinction, is it classified as cortical bone, having been converted into the same. Such conversion of calcification into cortex may be seen in residuals of previous calcifying lesions as healed fractions, aseptic necroses, repairs following osteomyelitis.

Normal cortex appears as well developed and thick in most of the shaft of a long bone. It is thin, or in the young, may be only faintly suggested near the end of the shaft and in the epiphyses, small bones and in the cancellus tufts of terminal phalanges.

Where cortex is scant, as in young developing epiphyses, irregularity of the cortical surface is to be expected, even to be so outstanding a feature as to lead to a mistaken diagnosis of disease. Thus, in areas where cortex is poorly developed, irregularity in outline alone without other abnormalities is not sufficient evidence that disease is present.

The surface of mature cortex is perfectly smooth and sharply defined against the soft tissues. This smoothness may be broken by certain normal structures, such as a canal for a nutrient artery or a ridge at a muscle attachment, but excepting such anatomical variations, irregularity of outline of well developed cortex is pathologic. The smooth cortical surface of bone undergoes resorption and regeneration constantly in the living. When the periosteum is healthy, regeneration occurs evenly and the cortical surface remains perfectly smooth. When the periosteum is not healthy, regeneration is uneven and the cortical outline becomes "bumpy" or even more grossly irregular. Slight irregularities of out-

line of mature cortex with no other visible abnormality indicates the presence of degenerative periostitis.

This slight irregularity of cortical outline must be distinguished particularly from normal ridges for attachment of muscle or membrane as these also tend to slight irregularity. This may be noted at the attachment of the tendo achillis on the posterior surface of the calcaneus. Such ridges can usually be identified by some lack of density as compared to the underlying cortex or the ridge may have a distinct cortex of its own.

Variations in thickness of mature cortex accompanied by other features may occur in many lesions, particularly those of trophic and destructive origin. Differences in thickness of otherwise normal cortex occurs with variation in the stresses habitually applied to the bone. The cortex becomes thicker then when stresses are greater, thinner when stresses are less. Stresses are proportionately less where the diameter of the bone is the greater. Thus, normal cortex is thicker at the midshaft, thinner toward the metaphyses. An excellent example of this is the thickening of the cortex of the shaft of the second metatarsal when there is a shortened and hypermobile first segment.

An increase in thickness of otherwise normal cortex is hypertrophy, decrease of thickness is atrophy. Decalcification is not atrophy as there is no change in the actual thickness of the bone but merely in the mineral content. There must be evidence that the cortex was thicker at some time if one is to say that atrophy is present: the bone as a whole may be well developed or the duration of the lesion may be too short to suggest underdevelopment. Hypertrophy and atrophy are very often directly related to stress effects.

Texture of the cortex is not definitely visible normally. Abnormal conditions may develop a visible pattern or texture. An example would be the definitely striated cortex of osteitis deformans, a typical texture pathognomonic of the disease. Other variations in texture may be noted by the presence of decalcifications, notably superficial decalcification, (from overlying inflammation) very often seen radiographically in a case of long standing bursitis of the first metatarsophalangeal joint. Also, trophic osteitis, a condition brought about by congestion in an area due to overintensive massage and heat to a bony area following a trivial injury. This is evidenced by abundant minute spots of decalcification (usually seen in the calcaneus and patella) with no soft tissue reaction, no effusion, no destruction, no calcifying reaction. These conditions must not be mistaken for serious lesions of bone.

The density of the cortex is normally even and great. It may be affected by conditions which cause decalcification, but the cortex does not reveal slight degrees of loss of density so well as does the bone as a whole. Loss of density is not indicative of loss of structure. Localized areas of cortex may become decalcified by the effect of hyperemia about an adjacent lesion, such as cellulitis. Such decalcification of a portion of the surface of the cortex is superficial decalcification. To avoid interpreting such an area as osteomyelitis one must be careful to note that the bone is not destroyed but merely decreased in density.

Although the periosteum is not visible in the roentgenograph, it has features which enable us to determine as to whether certain shadows are produced beneath healthy periosteum, diseased periosteum, at a site of rupture of the

periosteum, or in the soft tissues external to the periosteum. Healthy periosteum is a smooth membrane. If subperiosteal calcification occurs as a result of extravasation, it preserves the outline and contour of the healthy periosteum. Such calcifications are smooth in outline, fusiform in shape, even in density, and separated from the cortex by a thin dark line or area. These are static, inert, or subperiosteal calcifications of post-traumatic type, and may vary occasionally from the above description, especially if there is rupture of the bone covering.

Static calcifications tend to be clear-cut, harsh and transparent, similar to normal bone shadows. They do not tend to be confluent with cortex, but rather tend to be separated therefrom by a thin line or area. They have no tendency toward regular pattern such as lamination or striation. These calcifications may be irregular, flocculent or indistinct at first, but neither at that time nor later are they accompanied by reactive changes in the bone or soft tissues; the underlying bone is essentially normal, or at least, healthy in appearance. Reactive calcifications are commonly accompanied by other reactive changes in bone or soft tissue as seen both radiographically and clinically. The underlying bone varies from normal and the calcifications do not have the tendency to be separated from the cortex. They are often confluent therewith and, even in cases of long duration, irregularity of outline or the presence of striation is apt to be noticeable. Destruction or erosion may be added evidence of reactive calcification.

The subperiosteal calcareous deposits which have been mentioned have been referred to as calcifications. A useful distinction can be established between calcification and ossification, if defined as follows: ossification is calcareous deposit which directly and rapidly develops bone structure; the surface is more or less smooth and rounded, there is at least a thin line suggesting cortex at the periphery, and there is medullary texture centrally. Calcification is calcareous deposit which is amorphous at first and develops bone structure only slowly and indirectly. A calcification may have become ossified to some extent but there is practically always some portion which is still amorphous, void of recognizable bone structure. Such an area reveals that the process is a calcification. A true exostosis would exemplify ossification while subperiosteal elevations of long duration usually demonstrate calcification. Ossification is generally seen in growth, repair and tumor formation. All other calcareous deposits are calcifications.

Calcifications may occur in interstitial tissues or muscles even in the absence of any conspicuous etiologic factor. Such calcifications as seen from arteriosclerosis and phleboliths are good examples. These are termed physiological calcifications and are more common in the lower extremities than anywhere else in the body. When projected over the outline of a bone radiographically, care must be taken that they are not misinterpreted as condensations within bone or as periosteal or osseous outgrowths.

Reticular Bone

The internal structure of bone as seen in the roentgenogram is a fine reticular or lattice work of calcareous strands with radiolucent spaces representing the soft tissue elements. The texture is irregular but has a certain uniformity in its irregularity, so that the reticulum seems to flow evenly from one area

to another with no sudden changes excepting normal architectural features, such as, sites of epiphyseal lines and buttresses or ridges of dense bone (sustentaculum tali). Sudden variation in structure or texture without corresponding change in anatomical features is abnormal.

Bone undergoes certain physiological changes constantly. In the normal state, normal circulation tends to cause solution and absorption of the calcareous elements while, at the same time, stresses applied to bone by muscle tension and weight-bearing tend to cause the calcareous elements to be thickened by accretion of deposited mineral salts. The normal state, is the state of balance between these processes of absorption and accretion. That balance may be disturbed in either direction. In the presence of hyperemia, absorption is on the rise and the bone becomes decalcified. In the event of decreased functional stress, accretion is reduced and the individual calcareous elements become thinner — atrophy. These two are seen as entirely different entities radiographically. If circulation is diminished, absorption is decreased and the bone trabeculae become more dense or sclerotic. When stresses are increased, accretion is on the rise and the calcareous elements become thicker or hypertrophied. These processes are physiological transformations. Transformations should be distinguished from bone formation which is the evolution of bone from a tissue which is not bone, and from bone growth which is the formation of additions to bone by certain specialized tissues.

Sclerosis is to be distinguished from condensation and from nonreticulated areas in bone. When calcium deposit occurs in the bone marrow and fills up the interstices of the reticulum, a harsh opacity is evident which is condensation. The calcareous deposit is in the soft tissue between the bony trabeculae which it obliterates. The margin reveals a continuous opacity fading away to normal density. There are few or no dense trabeculae mingling with the normal at the periphery. In sclerosis, however, reticular structure is still evident although the calcareous framework is abnormally dense. With few exceptions, sclerosis is compatible with a healthy state of bone, but condensation is a reaction to an irritant found in infectious lesions, neurotrophic degeneration (Charcot's joints) and adjacent to areas of pressure atrophy.

The manner in which the density of condensation fades out at the periphery contrasts with the appearance of a nonreticulated area in bone—an area where a dense bone nodule instead of spongy, reticulated texture has been formed in growth. In such areas the transition from reticulum to dense structureless bone is as sudden and sharp as is the margin of reticular structure with the cortex. Nonreticulated areas are rarely of clinical significance, but are sometimes mistaken for serious lesions.

Decalcification is a loss of density in an area that may be complete for some trabeculae, but not for all. Accordingly, some reticular structure remains visible even though loss of density is great. This distinguishes decalcification from the various forms of loss or structure. In them, trabeculation is completely absent.

Decalcification may be of several types. Systematic decalcification is widespread about a joint or lesion; local decalcification affects a circumscribed area such as an epiphysis.

Loss of density of bone occurs normally with advancing years due to a number of factors. The strik-

ing feature is decalcification not atrophy of trabeculation. A certain degree of bone density is associated with a certain group. When speaking of any decalcification other than age atrophy, it should refer to density, less than normal for the age group of the patient.

In conclusion, trustworthy roentgen analysis is based on deliberation with respect to normal variations and to consideration of all anatomical tissues involved. Since osseous tissue is of prime importance in the majority of radiographic studies, a complete understanding of normal bone is essential. Only then can one evaluate pathology of bone as seen radiographically and corroborated clinically.

1810 Spring Garden St.

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Released for Publication by Publications Chairman, A.S.C.R.

USE OF HYALURONIDASE BY IONTOPHORESIS IN TREATMENT OF LYMPHEDEMA

FAVORABLE results are reported following treatment of lymphedema of the upper or lower extremities in five patients with hyaluronidase by iontophoresis. Use of constrictive elastic supports between treatments aided the maintenance of reduction of edema. A total of 103 treatments was given these five patients. In two of the patients there was profuse diuresis.

One of the patients, a woman with lymphedema in the upper extremity, refused to wear the constrictive support between treatments. In this case diminution in volume was comparable with that achieved in the other cases but could not be maintained between treatments. The technique for administering hyaluronidase by iontophoresis is described by the author in detail. By volumetric measurements in a tank for this purpose, it was possible to measure diminution of limb volume during a single half-hour treatment.

By means of intradermal injections of Evans blue dye it was demonstrated that hyaluronidase administered by iontophoresis caused dispersal of the dye over an area four times greater in diameter than that on the contralateral control side not treated with hyaluronidase. No untoward reactions were observed.

M. S. Schwartz, Arch. Int. Med., vol. 95, pages 662-668, May 1955

PHARMACEUTICAL PREPARATIONS FOR THE PROFESSION

Harry L. Hoffman, Ph.G., D.S.C.
Chairman, Council on
Chiropodical Therapeutics and
Pharmacy

A column devoted to preparations, new and old, with emphasis on their value and uses in everyday chiropody practice. This will be a regular monthly column and we invite questions, which we shall endeavor to answer, or obtain the answer.

Aquasol A Cream With Panthoderm

This preparation is anti-keratotic, anti-pruritic and a healing aid.

Description: Water-soluble vitamin A contains 200,000 U.S.P. units per ounce, with 2% pantothenylol (analog of pantothenic acid) in a special, water-miscible, and highly absorptive cream base.

Action and Uses: Helps to normalize the skin and reduce scaliness, roughness and dryness in hyperkeratotic skin conditions; relieves itching and accelerates healing, indicated in acne, ichthyosis, atopic eczema, seborrheic keratosis, follicularis, callosities, plantar warts and the excessively dry, rough, and scaly skin of the middle-aged and older patients.

Advantages: We understand that this is the only topical vitamin A preparation to contain pantothenylol. The vitamin A is water-soluble for more efficient absorption. The special water-miscible base assures maximum absorption of vitamin A and pantothenylol. The cream is clean-white, water-washable, and non-staining. Appears to be non-irritant and non-sensitizing.

Application: Apply by smoothing into area two or three times daily.

How Supplied: Aquasol A cream with panthoderm, in one ounce tubes, by the U. S. Vitamin Corporation, New York 17, N. Y.

Parenzyme Intramuscular Trypsin

Description: This is a sesame oil suspension of Proteolytic Enzyme Trypsin. The Trypsin is extracted from beef pancreas and purified by a special crystallization process for parenteral use. Each cc of sesame oil contains 5 mg. of Crystalline Trypsin.

Action and Uses: Produces rapid dramatic reduction of acute local inflammation in phlebitis (thrombophlebitis and phlebothrombosis); traumatic wounds. Also effective in the treatment of leg ulcers, (varicose and diabetic).

Administration: Intramuscularly, initially 2.5 to 5 mg. (0.5 to 1 cc) injected deep intragluteally 1 to 4 times daily for 3 to 8 days. The duration of treatment depends on the course of the disease. Maintenance therapy, in chronic or recurrent conditions 2.5 mg. once or twice weekly.

Caution: Must be used in a thoroughly dry needle and syringe. Potency is decreased by water.

Supply: Parenzyme (Intramuscular) Trypsin oil suspension, by The National Drug Company, in 5 cc vials.

Pantho-F Cream

Contains: Hydrocortisone (free alcohol, 1%, Pantothenylol 2%, in a stable water miscible base (10 mgn. Hydrocortisone per gm.).

Action and Uses: Relieves itching, pain and swelling and inflammation. Promotes rapid granulation and healing. Effective in Atopic Dermatitis, Allergic Eczemas, Contact Dermatitis.

Administration: After cleansing affected parts or areas, apply a

small amount of the cream, rubbing it in gently. Cover with sterile gauze dressing if desired. 2 or 3 applications daily have been found sufficient and effective, according to reports. As improvement is noted, applications are reduced to once daily or less.

Caution: Infectious lesions should be adequately controlled before applying Pantho-F Cream.

How Supplied: Available in tubes of 5 mg. and 20 mg., by U. S. Vitamin Corporation.

Question and Answer Department

I. M., D.S.C. **inquires:** How does Tolseram differ from Tolserol?

Answer: Both are muscle relaxants. The generic name for both is Mephenesin, both by Squibb, with this difference, Tolseram is a Carbamic Ester of Mephenisin. Actually the generic name for Tolseram is Mephenesin Carbamate whereas Tolserol is Mephenesin. Squibb tells us that Tolseram is not oxidized to the inactive myanesic acid in the body, whereas over 1/3 of the administered mephenesin undergoes such oxidation.

Advantages of Tolseram:

1. It results in sustained blood levels. Squibb tells us that blood levels of Tolseram are more prolonged and more uniform than those of Mephenesin.

2. It is relatively tasteless. The objectionable taste of Mephenesin is markedly reduced in Tolseram. Tolseram is mint flavored in a suspension making it acceptable to children. The tablets are relatively tasteless and the local anesthetic effect is less pronounced than that of Mephenesin tablets. The higher concentration of Tolseram Suspension (1.0 gram per teaspoon as compared to 0.5 gram per teaspoon of Mephenesin Elixir) makes it easier for patients to take enough of this preparation to obtain full effect.

Indications: For Tolseram, same as for Tolserol (Mephenesin) Squibb.

For muscle spasm of rheumatic disorders and allied conditions. In neurologic disorders where there is a skeletal muscle spasm. In preoperative preparation as premedication.

Effects: In rheumatic and neurologic disorders Tolseram relaxes muscle spasm without impairing muscle strength. It relieves stiffness and discomfort and permits increased range of motion. It does not interfere with normal muscular function. When given as premedication, Tolseram alleviates the fear and tension associated with manipulation and surgery.

No serious toxic effects have been encountered with Tolseram. Occasionally, a patient may complain of gastro-intestinal disturbances, but this can generally be avoided, if Tolseram is given after meals or with milk or fruit juice. (Please note, that frequently aspirin will cause gastro-intestinal disturbances and nausea if taken on an empty stomach.)

Contraindications: Apparently none reported.

Dosage: Usual adult dose is 1 to 3 grams (2 to 6, 0.5 gram tablets or one to three teaspoonfuls of Tolseram Suspension) repeated three to 4 times a day as indicated.

As a sedative prior to operative procedures, the usual dose for adults (2 to 6, 0.5 gram tablets or one to three teaspoonfuls of the suspension), 15 to 30 minutes prior to surgical or manipulative procedures.

For children the dosage should be proportionately smaller, calculated on the basis of age and weight. Whenever possible, Tolseram should be given after meals to avoid the possibility of gastro-intestinal disturbances. When this

preparation is given between meals, the patient should drink milk or fruit juice prior to taking Tolseram.

How supplied: Tablets 0.5 gram in bottles of 100. Suspension (20%) containing 1.0 gram per teaspoonful (5cc) in bottles of one pint.

Question by J. L., D.S.C.: What is Doriden and how supplied?

Answer: Doriden by Ciba, Summit, N. J. For daytime sedation or a good night's sleep. Ciba tells us that it is non-habit forming.

Average dosage: As daytime sedative 0.25 gram t.i.d. or q.i.d. after meals As a hypnotic 0.5 gram at bedtime.

How supplied: In scored tablets of 0.25 gram and 0.5 gram each.

National Press Bldg., Washington, D. C.

THERAPY IN INTERMITTENT CLAUDICATION

Atmospheric pressure and temperature changes, emotional disturbances, local inflammatory conditions, and the nature of the walking surface, among other factors, contribute to the intermittency of intermittent claudication. Symptoms may be felt before physical signs of insufficiency are clinically visible. These facts, as well as the intermittent nature of the condition, indicate that spasm plays an important role in causation. A rigid, apparently calcified artery does not necessarily have an obstructed lumen; it is the atheromatous artery upon whose plaques multiple thrombi form, which causes segmental interference with arterial flow.

Spasm, superimposed on local pathology, assumes an important role no matter how severe the local pathology may be. The spasm may be the occlusive factor, and the relief of spasm is essential in therapy.

A good peripheral vasodilator drug should increase blood flow to muscles without greatly increasing the flow of blood into skin vessels or into less sclerosed arteries. Generalized vasodilatation will cause a diminishing volume flow in the less distensible atherosclerotic peripheral vessels where it is needed. An increased cardiac output is required to compensate for relative diminution of blood volume.

The efficacy of a peripheral vasodilator drug may be measured by improvement in the subjective phenomenon of intermittent claudication, with reality of the improvement being tested by use of (substituted) placebo medication.

In a preliminary pharmacologic and clinical trial, Arlidin has appeared to be of exceptional effectiveness in treating angiospasm of intermittent claudication, and with minimal side-effects. The authors present five case histories which illustrate that Arlidin therapy is of value in cases of intermittent claudication. The patient, however, must be treated as a whole, with all psychosomatic factors carefully considered, and when diabetes is present, especial attention must be paid to nutritional factors. I.e., treatment must not be directed solely at the limb which exhibits deficient circulation. *Pomeranze, Gadek, Pitman, and Scherl. "Therapy in Intermittent Claudication." Angiology, Vol. 6, No. 3, June 1955.*

BOOK REVIEWS

THE SKIN, A Clinicopathologic Treatise, by Arthur C. Allen, M.D. 1,048 pages; 495 full-page illustrations; frontispiece in color. The C. V. Mosby Co., St. Louis, Mo., 1954. Price $25.00.

Publications which correlate the clinical with the histopathologic aspects of a disease have been lacking in the field of dermatology. In this volume the author has produced a clear and concise text of this type. One cannot help but appreciate the tremendous amount of work necessary for its publication.

The volume is well organized as to the contents of each chapter. Those on the so-called collagen and elastic tissue diseases, the vesicular dermatoses, the granulomas, the mycoses, the pigmentary disorders, the disorders of cutaneous appendages, the classification of skin tumors, tumors of the vessels, and the lymphomas are thorough and complete. The chapter on nevi and malignant melanomas is exceptionally good.

The book is rather bulky, but not in comparison to the tremendous amount of material presented. The bibliography is complete, and the index easy to use. The photography is extensive and unexcelled as to clearness of detail.

This book will be a happy addition to the libraries of institutions giving post-graduate training in dermatology.

JOHN H. COX, Capt. (MC)
USAFMJ, Dec. 1955

PRACTICAL MEDICAL MYCOLOGY, by Edmund L. Keeney, M.D. American Lecture Series, Publication Number 248, a Monograph in American Lectures in Internal Medicine, Edited by Roscoe L. Pullen, M.D., Springfield, Ill., 1955. Price $4.50.

In an era when fungus diseases are becoming rapidly more important, this small and easily readable monograph is most timely. It is well written and presents a difficult subject in a practical, concise, factual manner. The author, an expert in his field, considers separately each of the important recognized fungus diseases in man. Historical background, geographic distribution, key clinical features, laboratory identification of etiologic agent, mycology, immunologic features, prognosis, and treatment are well presented. Two small chapters on fungus spores as allergens and on the role of poisonous fungi as a cause of mushroom poisoning and ergotism are included. The more important fungus diseases each have an excellent diagrammatic illustration, summarizing the epidemiologic, clinical, and diagnostic features and the differential diagnosis.

The organization of the book with its thorough index makes for rapid, ready reference. The bibliography includes valuable recent contributions, in addition to many classic articles dating back to the latter portion of the nineteenth century.

It is seldom that a small book of this type contains so much practical information. It admirably serves its purpose in providing understandable and concise material for the student and practitioner.

RICHARD I. CRONE, Col., MC, USA, USAFMJ, Dec., 1955.

THE POSTURAL COMPLEX, by Laurence Jones, B.S., M.D. 156 pp. Springfield, Illinois, Charles C. Thomas, Publisher. $9.75.

The relation of pronated feet and faulty shoes to postural difficulties resulting in various neuralgic pains is presented with clarity

and positiveness by an outstanding orthopedist who based his opinion not on theory but on 500 clinical cases. Dr. Jones, formerly chief orthopedist at Menorah Hospital, Kansas City, offers the readers a series of interesting chapters, admirably illustrated, from his extensive knowledge on shoe therapy and problems of posture that account for pains in the feet as well as in other parts of the body.

While the chapter on evolution of the human foot is not as detailed as Dudley J. Morton presented in his earlier book "The Human Foot" it is complete and presents the basis of the book matter when in the second paragraph he states: "The foot is not only an integral part, but is actually the foundation of the body."

The author favors rigidity in the shoes and firmness in the correction of foot rotation and reports that the trend in the human foot is away from flexibility. In the chapter on shoes Dr. Jones demonstrates his mechanical expertness and offers valuable suggestions to the chiropodist; however, the average chiropodist's office would hardly permit going so extensively into the procedure of shoe correction and reconstruction.

Diagnostic routine and suggestions for physical examination are well presented with faultless diagrams. Mention is made on Page 71 of the "violin string" tightness of the plantar fascia as the cause of "that extremely common and refractory complaint, painful heels." In foot strains or pronated foot conditions the practitioner is likely to overlook this symptom.

Chapters of particular interest to the chiropodist include: The Postural History and Physical Examination, The Individual Inside Adjustment of the Suitable Re-enforced Shoe, The Correction of Foot and Body Posture in Children, and the Primary Trigger Mechanism.

The author is particularly insistent on the exact location of the metatarsal pad for metatarsalgia conditions and declares that when recovery in these cases is not satisfactory it is usually due to improper placement of the device. The chiropodist will agree with this statement; especially after observing this improper placement or over-sized thickness of a pad inserted by a shoe clerk or an inexperienced cobbler.

In the chapter on Adjuvant Therapy the author recommends whirlpool therapy and manipulation, presenting in detail the manipulation procedure for metatarsophalangeal fixation and stating: "By increasing the range of motion at the metatarsophalangeal junction, the fixed corrections become more effective in elevating the central metatarsal heads."

This timely volume is recommended for a refresher course in chiropodical orthopedics and deserves a special place in the practitioner's bookcase.

M. V. Simko, D. S. C., Bridgeport, Conn.

COMMUNICATIONS FROM THE PROFESSION

Letter to the Editor:

"I recently had my attention drawn to a copy of an article (from an American Journal) entitled 'The Common Corn' by L. London, D.S.C., Miami, Fla.

"I read this article with great interest as it is a subject capable of much investigation. Unfortunately the writer commences by deploring the lack of articles contributed by chiropodists on the pathology of the corn. In fact several quite long

contributions have been made on this subject in the last few years and published in 'The Chiropodist,' the official publication of the Society of Chiropodists in Great Britain. It seems a pity that there is not a greater interchange of literature between the countries in which chiropody is most advanced.

"I append a list of some of these articles:—

"Biochemistry and Corn Causation—A New Approach." Stewart. (Chiropodist. Jan., 1950)

"The reaction of the Epidermis to mild stimulus in relation to the pathology of corns and callous." Read. (Chiropodist. March, 1950)

"The role of Vitamins in the control of hypertrophy of the skin." Le Rossignol. (Chiropodist. Feb., 1951)

"The mechanism of corn and callous production." Read. (Chiropodist. May, 1952)

"External vitamin applications—The result of further trials." Le Rossignol. (Chiropodist. Jan., 1953)

"Disordered skin metabolism with special reference to the enzymes." Suvarna. (Chiropodist. April, 1953)

"It is significant that the bibliography in two of the above articles contains many references to American literature. I remain,"

John Gallerhew, M.Ch.S.

Letter to the Editor:

"The article 'Retirement for the Chiropodist' by Dr. M. V. Simko was excellent. It was realistic and practical. It was the product of a mature mind that understands life as it is. We need more articles on the same subject. 'Medical Economics' gives ideas to the M.D.'s on this subject every month, but this is the first we have ever had.

"Further, the article stands on its own merits. The commentary it evoked in your last issue is wishful thinking to say the least."

F. J. McCormack, Pod.D.

Letter to the Editor:

"My article on retirement was not intended to disparage chiropody or to belittle the capabilities of our members. However, since a reciprocal policy does not prevail between Florida and other states it is hardly likely an operator in his seventy's is qualified to take a state board examination. Furthermore, it is not unusual for some individuals to look forward to a change of occupation.

The exactness and the tension demanded of operative procedure in chiropody becomes intolerable or arduous after 40 or 50 years of practice so that certain individuals anticipate an escape into greener pastures.

Dr. Callahan states that savings should become automatic. However, sickness, adversity or improper investments not infrequently disrupt a planned schedule of saving; or the debacle of 1929 could account for an altered dream of pleasant retirement.

Moreover the suggestion for a partnership or a young associate to determine a future practice with a promise of security is not always a guarantee of contentment. The young operator who "revitalizes" an older man's practice is certain eventually to realize the superiority of his modern technique and the brightness of his halo. Then the urgency of hanging up his own shingle decides his next step.

Selling shoes or watching birds might prove a welcome departure for some chiropodist because it is different from bromidrosis or onychomycosis."

Michael V. Simko, D.S.C.

The following is a copy of a letter sent to Drs. Dyer and Cohen:

"I wish to compliment you on your paper published in the December, 1955 issue of the N.A.C. JOURNAL entitled 'A Report on the Use of Negative Galvanic Current in the Correction of Incurvated Nails.'

"I join you in recommending this nail correction procedure since I have treated over three thousand (3,000) side of nails with negative galvanic procedure in the past sixteen years. I did the original experimenting and finally perfected the procedure and presented it for the first time in Newark, N. J., on February 13, 1944 at the Chiropodists Society of New Jersey Annual Symposium. The paper was entitled 'Negative Galvanism in Nail Surgery.'

"You are correct in observing that this electrosurgical technique has never been reported in our national publication. In the past 12 years I have described and demonstrated this nail correction technique at the Ohio College of Chiropody, the Illinois College of Chiropody, the California College of Chiropody, and Temple University, School of Chiropody and at scientific meetings in many parts of the country, but never got around to having it published."

Morton Polokoff,
D.S.C., F.A.S.C.R.

THE WM. J. STICKEL ANNUAL AWARDS FOR RESEARCH IN CHIROPODY FOR 1956

Sponsored by the

Journal of the National Association of Chiropodists

and The NAC Agency, Inc.

Twelfth Year of Awards

First Award — $400.00

Second Award — $250.00
Third Award — $100.00
Fourth Award — $50.00
Fifth Award — $50.00

Members who desire to submit papers should make application on a form which can be obtained from the Secretary.

Research papers on any subject in the field of Chiropody may be offered. The final date on which papers will be accepted is April 15, 1956.

1956 COMMUNITY HEALTH WEEK

MARCH 18-24, 1956, has been designated Community Health Week, to be headlined under the banner "Let's Do More About Health." The National Health Council and the United States Junior Chamber of Commerce are the sponsoring organizations.

The success of the initial observance of Community Health Week in March 1955 led the sponsoring organizations to their decision to repeat the performance. Last spring, 180,000 Jaycees across the country helped to arrange health fairs and rally the people to attend. Their efforts inspired television and radio shows as well as newspaper features and special news sections telling the people about needs of local health services and the health resources to look for in their own community.

The United States Junior Chamber of Commerce will have available after January 1 a work kit which it has produced as a guide for those engaged in organizing activities for a community health week. The kit will be distributed to Jaycee chapters requesting it from the Tulsa, Okla., headquarters of the junior chamber. In communities without Jaycee chapters, local affiliates of national organizations may request kits from the National Health Council, 1790 Broadway, New York 19, N. Y.

The contents of the kit, prepared by members of the staff of the National Health Council and its member agencies, include leaflets describing "Newspaper Health Supplements," "Health Fairs," and "Movies Tonight"; a checklist of projects which a community may launch during health week, such as accident prevention campaigns, establishment of preschool clinics, fluoridation of municipal water supplies; and a list of National Health Council member agencies to facilitate community cooperation.

The National Association of Chiropodists is a member of the National Health Council. In some areas Chiropodists and their societies participated, especially the "Health Fairs."

What is your Chiropody community doing?

NATHAN SCHULMAN SCHOLARSHIP

THE Board of Trustees of the New York College of Podiatry is pleased to announce the establishment of the Nathan Schulman Scholarship leading to a Doctorate in Podiatry. Applications must be in not later than April 15, 1956. For full information write to: Dean, New York College of Podiatry, 53 East 124th St., New York 35, N. Y.

This award will be made annually so that ultimately there will be four students in attendance at the school on a scholarship basis. The minimum requirements are satisfactory completion of two years study in an approved college or university.

The College is pleased to name its first scholarship after the President of the Board of Trustees of the College, Mr. Nathan Schulman, who is in the real estate and banking business. He has continually shown a deep interest in the college's work and has taken an active part in raising monies for the College and Clinic. Mr. Schulman is a personal friend of the President, Dr. M. J. Lewi.

An important purpose of this award is to make known the fact that men of standing in their community are interested in podiatry-chiropody and are doing all they can to bring the subject of scientific foot care, as practiced by the foot specialist, to the public notice.

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Rules and Pertinent Information

1. Awards will be offered for papers on Research in the field of Chiropody.

2. The monetary considerations provided are as follows:
   First Award—Four Hundred Dollars
   Second Award—Two Hundred Fifty Dollars
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3. The manuscripts will be judged by a Committee comprising three officers of the N.A.C. The Committee is authorized to withhold the granting of awards in the event any or all papers submitted are considered to be of insufficient merit.

4. The recipients of the Awards will be announced at the Annual Meeting of the Association in 1956.

5. All papers received become the property of the National Association of Chiropodists and shall be available for reproduction in any publication sponsored by the Association. Papers must be original and all rights with regard to publication are assigned to the National Association of Chiropodists. The originals of all submitted papers and manuscripts will be placed in The WM. J. STICKEL MEMORIAL LIBRARY AND MUSEUM.

6. Papers entered must be in the hands of the Secretary by April 15, 1956.

7. Manuscripts should be typewritten and double spaced. No limits or restrictions are imposed on the number of words, use of photographs, charts, etc.

8. All inquiries concerning the Awards should be addressed to the Secretary. Members desiring to submit papers must make application on a form provided for that purpose which can be obtained from the Secretary.

9. Photographs, diagrams, drawings, statistical charts, etc., will be of value in presenting the subject of your choice.

10. Authors may be required to submit a synopsis, abstract or report of their presentation. This will be for publication in the JOURNAL OF THE N.A.C. should it be desirable but impracticable to publish the original.

Contributions from The N.A.C. Agency and from J.N.A.C. provide the Awards for 1956.

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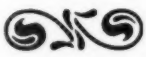

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ORGANIZATION NEWS

NATION'S BUSINESS REPRINTS

IN ANSWER to the many requests for reprints of the Nation's Business "Foot Fatigue Costs $125,000 a Year," the JOURNAL will supply reprints at no cost to each state on the basis of 100 plus 2 for each member. Each state, if it wishes, may reproduce locally any larger quantities it may desire. A limited number of additional reprints will be available at cost, $1.75 per hundred, including handling and mailing charges.

FLORIDA

AN illustrated lecture on "X-Ray Interpretation of Foot Conditions" was given to chiropodists in Miami, Fla., on December 20, 1955, by Dr. Milton Lewis of Chicago, Ill.

ILLINOIS

THE Mid-State Branch of the Illinois Chiropody Society held its meeting December 4, 1955 in Peoria. An entire afternoon session was devoted to the scientific program and the subject of discussion was "Children's Foot Problems."

Dr. Philip Brachman, attending chiropodist at the Chicago Mercy Hospital Rehabilitation Center, conducted the program.

The Business Meeting was under the direction of Dr. John R. Graham, who is president of the group.

MARYLAND

THE chiropodists of Wicomico County, Md., started their eighth annual foot examination program for all the schools in the County. This program includes examination of children in all schools which total, at the present time, approxi-

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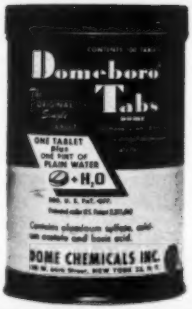

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mately 8,500. The parents will receive notices from the Board of Education informing them of the condition of their children's feet.

The survey is being conducted by the following chiropodists: Drs. V. S. Cantrell, T. W. Kleger and S. J. Kleger, all of Salisbury, Md.

NEW MEXICO

THE dates of the examination to be given by the New Mexico State Board of Chiropody have been changed and will be held July 14-15, 1956 at the Hilton Hotel, Albuquerque, New Mexico.

PENNSYLVANIA

THE Western Division of the Chiropody Society of Pennsylvania held its meeting on January 12, 1956 at the Mellon Institute in Pittsburgh.

Dr. Joseph A. Camarata, Superintendent of the Dixmont State Hospital, was the scientific speaker for the evening. His topic of discussion was "Problems of Psychiatry."

A.C.F.S. HOLDS MEETING

THE Executive Board of the American College of Foot Surgeons held their meeting on Saturday, November 26, 1955, at the Drake Hotel in Chicago. Plans were made for the progress of the organization; and the inception of a Surgical Brochure was approved.

The following were present: Dr. S. F. Korman, President, Toledo, Ohio; Dr. Ned J. Pickett, Vice President, Norfolk, Nebr.; Dr. Ralph E. Owens, Vice President, Oklahoma City, Okla.; Dr. Earl G. Kaplan, Treasurer, Detroit, Mich.; Dr. Jack M. Kohl, Secretary, Chicago, Ill.

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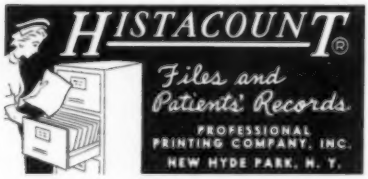
course in foot roentgenology conducted by the American Society of Chiropodical Roentgenology at the Hotel Astor in New York City recently. Subjects covered during the course consisted of: (1) Unsatisfactory Radiographs; (2) Exploratory Radiographic Examination; (3) Positioning of the Foot; (4) Physiology of Bone; (5) Diseases of Bone; (6) Pathomechanics. (7) Podopediatrics; (8) Analysis of X-Rays; (9) Roentgen Findings of the Arthritic Diseases; (10) Fractures and Dislocations; (11) Orthodigital Problems; (12) Surgery: Pre and Post Operative Radiograms.



Representing the Society were Ralph Sansone, D.S.C., F.A.S.C.R., Chairman; Joseph W Gilden, DS.C., F.A.S.C.R., Registrar; and H. Burton Le Vine, D.S.C., F.A.S.C.R. Progam.

Registrants included chiropodists from New Jersey, New York, Connecticut, Massachusetts, and Pennsylvania.

Instructors, in addition to the committee, were as follows: Drs. L. X. Kurzrock, E. F. Hartford, I. Yale, V. A. Jablon, R. K. Locke, J. E. Bates, N. T. Lambert, B. D. Sherman and M. M. Polokoff.

AMERICAN ACADEMY OF CHIROPODISTS MEETS

THE American Academy of Chiropodists is holding its 11th annual meeting, February 19-20, 1956, at the Hotel Statler in Cleveland, Ohio.

An outstanding program in the field of chiropody has been

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arranged covering the foremost common problems in everyday practice: orthopedics, diagnosis, surgery and x-ray.

Leaders in each field have been asked to speak at the meeting. One of the highlights will be the Orthopedic Panel. At the end of the discussion, an open forum will be held so that the audience will be able to discuss questions they wish to bring up.

The following speakers will participate: Dr. James E. Bates, Huntington, W. Va.; Dr. Jack M. Kohl, Chicago, Ill.; Dr. Harold W. Orr, Wilmington, Del.

The Orthopedic Panelists will be Dr. F. Frost, Toledo, Ohio, Moderator; Dr. H. Wheeler, Chicago, Ill.; Dr. R. Schuster, College Point, N. Y.; Dr. J. Titus, Cleveland, Ohio; Dr. D. L. Jones, Warren, Ohio; Dr. R. Dye, Sandy Lake, Pa.; and Dr. H. L. Collins, Columbus, Ohio.

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MOOD ELEVATORS

Contributions to this column are more than welcome. In fact it depends upon them.

A.O.P.

THEY were window shopping, the man and his little son and it was quite evident from their attire that they had come into town from one of the dude ranches nearby.

The little boy pointed to several pairs of brassieres. . . . "Daddy, what are those?"

Daddy thoughtfully fingered his chin, then, patting his thigh, "Son, they are something like our holsters."

THE lady driver was quite vehement in her protestations of innocence but the policeman kept right on writing up her ticket.

"How do you treat the ones that are *really* guilty?" she demanded in a tone heavy with sarcasm.

"Lady," said the officer without looking up, "I wouldn't know. The only ones I give tickets to are always innocent."

"THAT man you sent me to for my shoes," said the doctor's patient, "is really quite a wonderful fitter. He took such pains to fit me just right."

"Yeah, that's true," agreed her chiropodist, "but he can tell the corniest jokes."

(Continued on Page 131)

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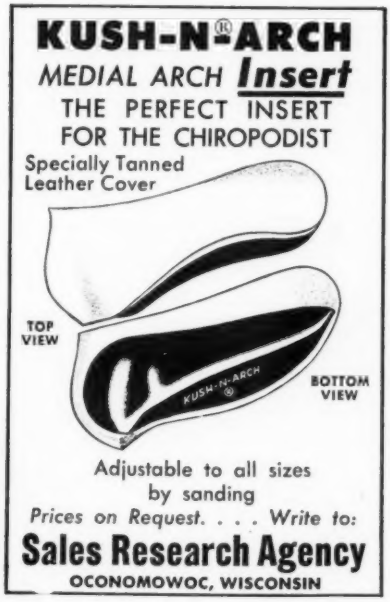
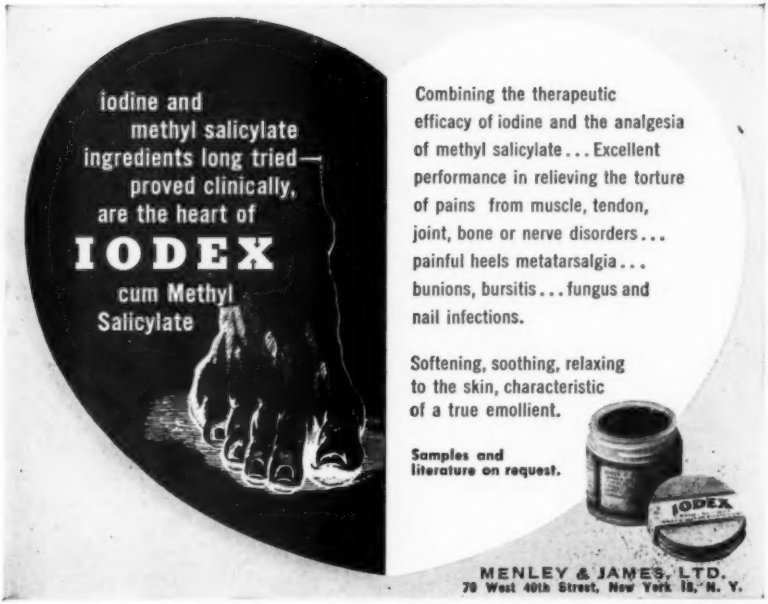
MOOD ELEVATORS

(Continued from Page 129)

For some time, as he went on with his sermon, the minister had been watching one of his parishioners who was continuously dabbing at her eyes. As soon as he could get to her after the service he said, "My dear woman, you seemed very much affected by the sermon. What's troubling you?"

"Oh, Pastor, it wasn't the sermon. It was my feet. They are killing me!"

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Dr. Harold W. Riepen
Colorado Springs, Colo.

Dr. Anna C. McCarthy
Philadelphia, Pa.

DR. ANNA C. MCCARTHY of Philadelphia, passed away on December 24, 1955, after an illness of five weeks. She graduated from Temple University in 1923.

Dr. James E. Delaney
Springfield, Mass.

DR. JAMES E. DELANEY of Springfield, Mass., died on December 17, 1955. He was 75 years old and was a graduate of the New York School of Chiropody and Temple University.

Dr. Samuel Shuster
Philadelphia, Pa.

DR. SAMUEL SHUSTER of Philadelphia, died on January 3, 1956. He was president of the Class of 1929 and a member of the Pi Epsilon Delta.

Dr. Raymond E. Conway
York, Pa.

DR. RAYMOND CONWAY of York, Pa., passed away on January 12, 1956, following a long illness. He was a veteran of World War I and graduated from Temple University in 1921. Dr. Conway was a charter member of the Pi Epsilon Delta Fraternity, a past officer of the York Lodge of Elks and a past state Commander of the Veterans of Foreign Wars. He was the legislative chairman of the Chiropody Society of Pennsylvania. It was during his regime that the State Legislature in Pennsylvania passed the first Pennsylvania Chiropody Law.

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April 6-8, 1956
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REGION THREE
Atlantic City, N. J.
April 12-15, 1956
The Ambassador

REGION FOUR
Columbus, Ohio
May 17-19, 1956
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A PERFECT COMBINATION

Made With or Without Casts

The new **SaperFlex Molded Inlay** combines time-tested, lightweight **Super Saddle leather shells** with a balancing element of Saperston's **exclusive formula sponge rubber*** hand buffed to individual requirements presenting a utility appliance which is solving many of the profession's most difficult problems.

Our own density controlled rubber is the most **versatile** — the most **comfortable** — and the most **successful** material for corrective elevations. Its action is instantaneous and automatic. Practically indestructible it never crumbles, packs down, or distorts, affording continued **sustained balance.**

The **automatic conformity** of the balancing area permits firm, but yielding contact from heel to toe — the Super Saddle effect inhibits lateral motion — creating the desired **stability** and **comfort.**

TO ORDER IMMEDIATELY specify **Saperflex** Molded Inlays — Regular or Heavy Duty Construction.

OR FOR COMPLETE INFORMATION, Write Dept. J.

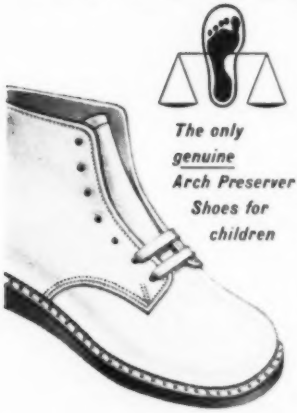
* **NOT foam** or **commercial** sponge rubber.

SAPERSTON LABORATORIES

NEW ADDRESS: 22 W. Madison St., Chicago 2, Illinois

established 1918

A sturdy base for adding needed inlays



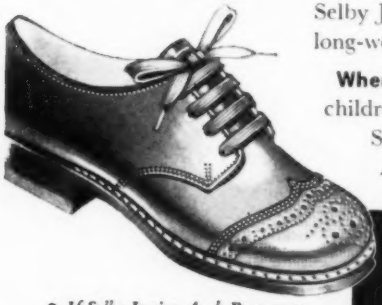
The only genuine Arch Preserver Shoes for children

As a Chiropodist, you know that a shoe built for children should have a sturdy base so that inlays can be added at the doctor's discretion.

Selby Junior Arch Preserver Shoes are designed and constructed to meet the special needs of infants, and children.

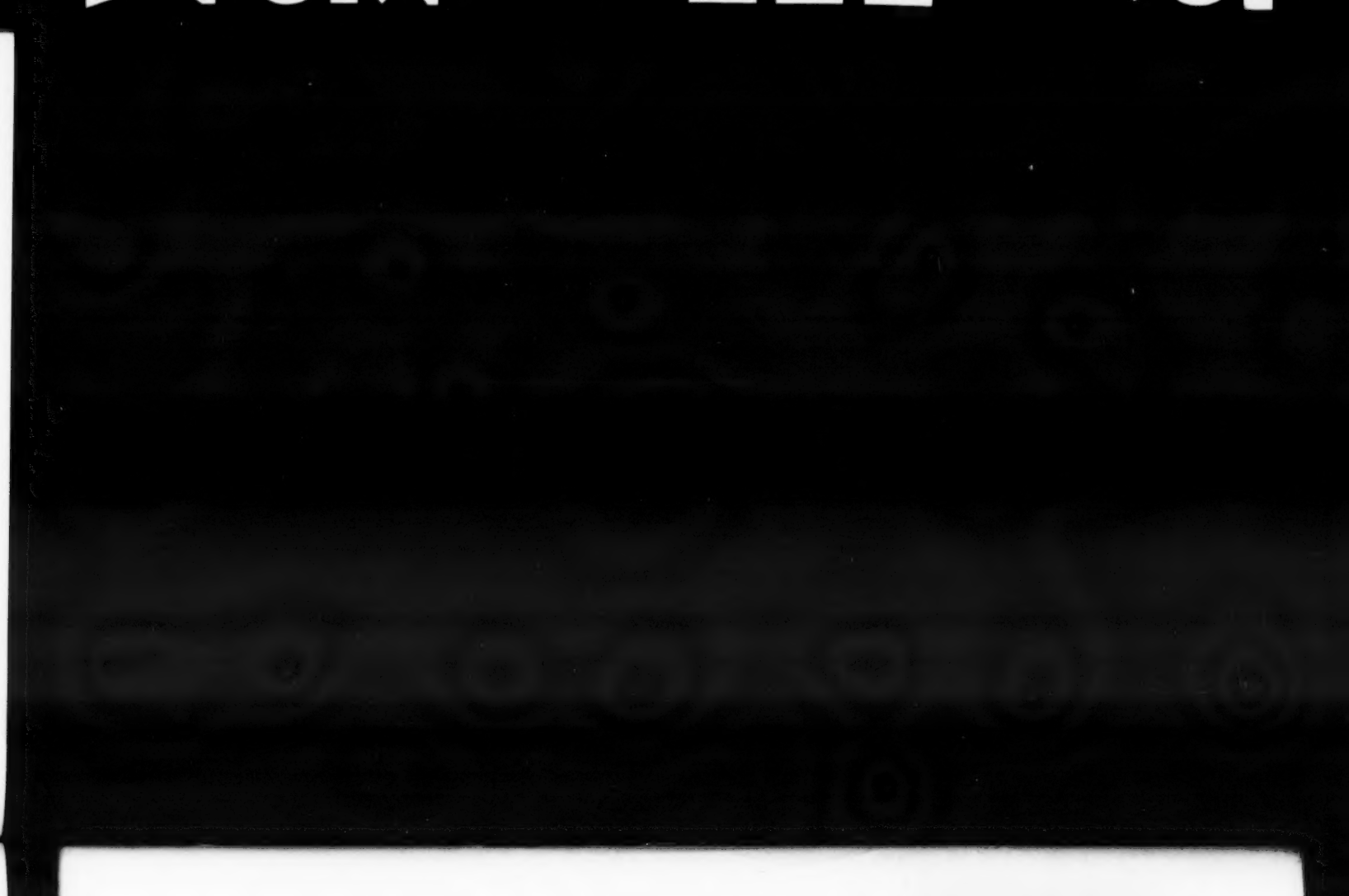
There is a wedge insert at the inner border of a flanged, broad-based heel. Tempered alloy spring steel shanks—especially moulded, and graduated to size—*afford a sturdy base on which additional inlays can be added when indicated by the doctor.* Selby Juniors are made of light, flexible, long-wearing, highest quality leathers.

When you recommend shoes for the children of your patients, remember—Selby Juniors are the only *genuine* Arch Preserver Shoes for children.



• *If Selby Junior Arch Preservers are not available in your city, please write directly to us.*

The Selby Shoe Company
Portsmouth, Ohio

Selby
JUNIOR ARCH PRESERVER
Shoes

MORE THAN THREE QUARTERS OF A CENTURY OF FINE SHOEMAKING